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PROCEEDINGS

OF THE

AMERICAN DENTAL CONVENTION,

THE

SOUTHERN DENTAL ASSOCIATION,

AND THE

DENTAL ASSOCIATION

OF THE

State of Maryland and the District of Columbia,

IN UNITED MEETING,

Held in Oakland, Garrett County, Maryland,

AUGUST 14, 15, 16 & 17, 1877.

BALTIMORE:
INNES & COMPANY, PRINTERS,
Adams Express Building.

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PROCEEDINGS.

MEMORIAL CHURCH, OAKLAND, *August 14th*, 1877.

The American Dental Convention, the Southern Dental Association, and the Dental Association of Maryland and District of Columbia, assembled at 12 o'clock M., in the Memorial Church (the use of which had been kindly tendered to them): Dr. W. H. Atkinson, President of the American Dental Convention, as President of the United Meeting, and Dr. A. C. Ford, Vice-President of the Southern Dental Association, and Dr. R. Finley Hunt, President of the Dental Association of Maryland and District of Columbia, on his right and left as Assistant Presidents.

The meeting was opened with prayer by the Rev. Dr. Bacon, of the Episcopal Church of Oakland.

Dr. Edward Nelson, of Frederick, Md., then delivered the following address of welcome:

Gentlemen of the American Dental Convention, and of the Southern Dental Association:—In the name of the Dental Association of Maryland and District of Columbia, permit me to extend to you a cordial welcome to the hospitable soil of Maryland. Here, amongst these glorious hills, while the outside world is sweltering in the heats and turmoils of active industry, we have come to extend to you a hearty greeting; recognizing in you worthy members of an honorable profession, whose attainments in art, science, and literature, are wresting from cynicism and self-sufficiency a certain, though it may be an unwilling, recognition. We have come to confer with you; to interchange views; to drink in the inspiration of your learning and research; and perhaps, if not deemed presumptuous, to offer, upon our part, some humble suggestion, that may cast a feeble ray of light upon your future path, and serve to render less dark and rugged the

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difficult steep which leads to the temple of enduring fame. What you know we want to know; what we know, if perchance anything, we want you to know. To-day we banish all jealousies, and we admit no rivalries, except such as spring from a generous emulation of all that is good and true in science and in art.

Aristotle, in explanation of his doctrine of substantial forms, once said, that a statue lies hid in the block of marble, and that the art of the statuary only clears away the superfluous matter and removes the rubbish; the figure is in the stone, and the sculptor only finds it. Our profession may, as yet, be only that unhewn block of marble; but we know that there lies within, the beautiful form of a noble science. We have come to take counsel of each other; to clear away the superfluous matter, to remove the rubbish. We have come, as the sculptor of Aristotle, to find that form.

Until within a comparatively recent period, but little attention was bestowed upon the science of Dentistry. As a rude mechanical art, it had its rise, like medicine, amongst the ancient Egyptians, who, it is supposed, confided their aching mouths, as well as their lacerated and disjointed limbs, to the tender mercies of the professors of the art tonsorial. Even amongst the refined and enlightened Greeks, during the period anterior to Hippocrates, the healing art appears to have made but little progress, and it is probable that nothing more was attempted than the curing of external wounds. Æsculapius and his successors founded several schools for the study of medicine, and were invested by popular credulity with marvellous gifts by the gods; but it was not until a later period that the Greeks appear to have had any acquaintance with anatomy. Hippocrates was the first systematic writer upon the science of medicine; and though a man of uncommon acuteness of intellect, combined with great knowledge and experience, his views of the structure and anatomy of the teeth were fanciful and erroneous. Even Aristotle, the great rhetorician and philosopher, and the pupil of the "divine Plato," though the first to bring both physics and natural history into a scientific form, exhibited a lamentable ignorance upon this subject. After this period the successors of Hippocrates appear to have wandered from the path illumined by the steady lamp of experience, and to have lost themselves in labyrinths amidst the glare of brilliant but useless speculations.

To Claudius Galenus, who wrote two hundred years after Christ, is due the honor of producing the only account of the teeth, of any value, which had appeared up to his time. Whatever may be thought of their dental literature, however, it is sufficiently certain that amongst the Egyptians, Greeks, and

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Romans, the treatment of the teeth was practised in connection with general surgery. The excavations at Pompeii have brought to light implements evidently used in operations on the mouth; and it is even said that teeth filled with gold have been found in Egyptian mummies.

It is only in very recent times, however, that Dentistry has assumed the dignity of a distinct profession, owing, it may be reasonably supposed, to the time necessarily consumed in its operations, and the nice manipulative skill requisite for its successful practice. It is not my purpose to enter into any review of the early history of this science; nor would it afford any matter of gratification or novelty to describe the barbarous methods employed by its pioneers, ancient and modern, in alleviating the pangs of the toothache.

With the birth of our own republic began the first and only real progress in Dentistry; but since that time, perhaps no department of human knowledge or industry can exhibit more gratifying results. The "History of Dental and Oral Science in America" tells us, that less than forty years ago there was not a dental association in the country; to-day there are over eighty; whilst in the same period there have sprung into vigorous existence thirteen dental colleges, whose curriculum is equal to that of the best medical schools. Its professors are distinguished as a body of men of a high order of intellect, of general and varied learning, and of undoubted scientific attainments. In the mechanical departments this progress is still more marked. From the barbarous turnkey to the scientifically constructed forceps; from the rude plug of tea-lead to the beautiful filling of crystalline gold; from the chisel-shaped excavator to the exquisite burring engines of to-day; from the barber's stool to the modern operating chair; from the illy carved tooth of yellow ivory hung upon wire and rattling in the mouth like dice in a player's box, to the admirable artificial dentures of to-day, gleaming between the lips of beauty like quaruletts of pearls. All these are not only wonderful improvements, but giant strides of progress, and the sure harbingers of the future advancement of our profession. It is a subject of congratulation for the philanthropist that the importance of this science is yearly becoming more widely acknowledged; and it should be a cause of no little pride to America, that to the genius and industry of her sons is mainly to be attributed this gratifying result. The wife of a certain Jack Ketch, speaking in terms of admiration of the skill of her bosom's lord, is reported to have said that there were many persons equal to the plain work of a common hanging, but that to cause the culprit to die sweetly belonged to her husband alone. May we not say that the introduction of dental anæsthetics has not only robbed the

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dreaded forceps of their terrors, but has almost rendered extraction a pleasurable operation? Such is a very imperfect glance at some of the advances made in our profession; advances, however, which candor compels us to admit have reference rather to the skilful adaptation of mechanical appliances, than to the knowledge and application of pathological principles.

We may dispute as we will about systems of education; we may grow red in the face and tear a passion into tatters in the vain assertion of our own dignity and importance; but the fact still remains, that the acquirements of the general practitioner of dentistry are not what they should be, and that there is amongst them not only a lamentable want of polite learning, but an almost entire absence of broad, comprehensive medical culture. The human body is one connected system; composed of a multitude of parts, but nourished by the same aliment, vitalized by the same blood, pervaded by the same nerves, controlled and directed by the same will, and subject to the same common law of reciprocal sympathy; a complex machine, comprising a great variety of organs, and upon the proper performance of the functions of each depends the harmonious action of the whole. For example, an impression upon the surface of the skin from a high or low degree of temperature, by an established law of sympathy, is telegraphed to the stomach; this organ becoming irritated, there is a general disturbance of its functions. Now, owing to the susceptible state of the bowels, they will come within the influence of the same cause, and the effect may be some one of the enteric diseases. Or, by the same law of sympathy, the primary impression may be communicated to the lungs, and pleurisy, pneumonia, or pulmonary consumption result; and thus death may ensue by the simple impression of temperature upon the skin. Again, for the proper performance of its functions the stomach should be in a healthy condition; but this healthy condition may be seriously deranged and its whole economy thrown into disorder, and even fatal consequences result, from intense pain, as it shoots and vibrates along the nerves from the swollen and inflamed pulp of a single tooth. Thus we see that the diseased condition of an organ, and the consequent derangement of its functions, may have their origin in an unhealthy condition of the teeth; whilst on the other hand, pain may be communicated to the teeth by an undue excitement in some one of the other organs. In both cases it is the province of science to make its diagnosis and apply the proper remedy. Dyspepsia, phthisis pulmonalis, neuralgia, epilepsy, rheumatism, affections of the ear and eye, and even insanity, have each and all had their origin in a carious tooth.

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The dental surgeon discovers that an aching tooth is in a perfectly sound condition; what then? Criminal ignorance might apply the forceps and thus remove a temporary effect, the cause of which a scientific discernment might trace to the sympathetic influence exerted by an inflamed uterus. It is the ignorance of such and like principles, thus hastily indicated, which has brought our profession into disrepute. Ignorance and empiricism are the twin curses of our calling. A broad, comprehensive scientific culture is the only, but sure, antidote. The world will and can have but little confidence in the scientific attainments of the practitioner, who but yesterday was plying the useful but unintellectual calling of the tinker, or who parades in the public prints his fallacious and deceptive claims upon its patronage. There may be specialties in practice; indeed, by the very necessity of time and opportunity there must be; but whoso, in theory, attempts to divorce any one of these from the study and knowledge of the principles which underlie and control the whole, must end in inevitable failure. As well might he attempt to construct a system of astronomy, whilst ignoring the central orb around which all the others revolve.

We have thus far accomplished much; more perhaps than any other profession in the same space of time. Already the current of advancement has been turned into a scientific channel, and thus the first great victory for progress has been won. The mists of prejudice, which for so long a time have enveloped the medical profession, are being gradually dispelled before the steady sunlight of truth. Society, with judicious discernment, has already recognized the characteristics of the polite educated gentleman, and hence its demands for more than manipulative skill; each year finds us one step at least farther advanced, and erelong our struggling profession will occupy an honored niche in the temple of science, and its disciples be justly recognized as among the benefactors of the human family. It would be well, however, to remember that Rome was not built in a day, and that a tortoise once outstripped a hare in the race. Much remains yet to be done. The hill of science is steep and beset with difficulties.

In conclusion, I am tempted to quote the warning of the Scythian ambassadors to Alexander, on his making preparations to attack their country: "Take care that you do not, all at once, grasp at more than you are equal to. Consider the usual course of things; reflect that great trees are many years in growing to their height, and are cut down in an hour. It is foolish to think of the fruit only, without considering the height you have to climb to come at it. Take care, lest while you strive to reach the top, you fall to the ground with the branches you have laid hold on."

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DR. ATKINSON made his opening address, as follows:

GENTLEMEN:—In the absence of any prepared address—with which absence I am rather gratified than otherwise—I will have to beg your patience while I make a few remarks pertinent to this occasion.

Association has been, from the earliest history of mankind in society, the means of communicating discoveries, one to the other, arranging the perception of discovery of scientific truths, and their relation to the whole. The recapitulation of the history of the American Dental Convention would be too tedious, and I will only lay before you a few points. It originated upon the disruption of the society called the American Society of Dental Surgeons; in consequence of a difference of position arising out of a difference of opinion among the members of that society. When the learned and the unlearned come together, those who have the reputation of being learned are the most strenuous in laying down rigid rules, by which others may be admitted, or remain members of the association. On this and other points arose the differences of opinion which resulted in the disruption of the American Society of Dental Surgeons, and the formation of the American Dental Convention. The first time I had the pleasure of meeting with that body was in 1857, at their convention in Boston.

In 1859 a circular was issued to the profession at large, a few days before the opening of the American Dental Convention, looking to the formation of another dental association. This met with much opposition. That other organization, when it was born and baptized, was under the name of the American Dental Association at Washington, and your speaker was its President. The intention was to have an organization made up of local societies.

There has always been more or less of jealousy and want of good feeling, on one side or the other, between these two organizations, and consequently they have not worked together in the common cause. My purpose in these remarks is to preface our coming together to-day, by showing that all the good of association that is capable of coming to us, is marred if we set ourselves up one against another.

Last year I was notified that they proposed to elect me President of the American Dental Convention. I said, as my custom is, "If you elect me I will not serve." But wanting things to go on harmoniously again, I reconsidered and accepted. And I thought for the time that it would be well; but "man proposes and God disposes." Let us see in the future whether we shall rejoice at that, or be sad.

A committee was appointed at the American Dental

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Association last year, by the earnest desire of the most earnest and illuminated minds, to reorganize in one point that association. That committee was Dr. R. Finley Hunt, of Washington, Dr. Wm. H. Morgan, of Tennessee, and myself. The Chairman sent me a draft of report and resolutions to be presented to the American Dental Association at its meeting this year, from which I am just returned. The report was accepted, and there was a motion made and adopted to add seven more members, so that the Committee should be ten, and that Committee has in charge the question of organizing the association into permanent sections; the individual members of the association to be required to do work in one or more of the sections. We want it to go on harmoniously; we want to come to the sepulchre of the truth; we desire to get together earnest workers that would be judges of the work they were doing. The subject of the formation of a National Representative Association of the Dentists of the whole country was also referred to this Committee. We do hope and confidently believe that that Committee will so work as to accomplish what was intended years ago, that is, to have an organization made up of representatives from all State societies.

And then, what is the missionary work to be done, and by whom can it be done best? No doubt it can be done best by men from all localities. Then they will get into working order, and men will learn that Dental Associations are necessary, and this getting together to wrench unclean money from their patients will be stopped.

Thus I have given you a succinct account, arriving at much that may be important to the status of our profession to-day.

There was much opposition at Chicago when the report was read that was penned by our beloved brother Hunt. I was enabled to make it so clear that the vote was unanimous to accept that report.

Gentlemen, please accept this as a little bit of history.

Dr. Ford, V. P. of the Southern Dental Association, followed him with a few pertinent remarks, in which he expressed his pleasure at being present in a meeting of this kind. He had always been a great advocate of associations and associated effort. There is much to be learned by the attrition of minds, and much mutual benefit is derived from our thus meeting and counselling together. We learn to know each other better, and false impressions are done away with and correct judgments substituted. He trusted that we would be

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courteous to each other in every way, and thus evolve the best feelings that we can. It was the part of wisdom to be silent when one has nothing to say; and as he had not been aware that an address would be expected of him, and therefore was unprepared, he would endeavor to act that part by saying but little.

Dr. Hunt, President of the Md. and D. C. Association, addressed the meeting, as follows:

Gentlemen:—Many, if not all the circumstances leading to and surrounding the occasion on which we are convened, combine to give us cause of congratulation. The assembling to-day of three organizations in united meeting is an occurrence worthy of all attention and consideration. Regarded as an event in the history of our profession, it is of great importance, as marking a large advance in our progress towards that concert of action, that harmony and union of effort, which is so indispensable to the accomplishment of what may be called the "Mission of Dentistry"; and it is to be hoped that before we separate, we will, in the discharge of the duty so plainly pointed out by the logic of events, have laid, deep and sure, the foundation of a system by which the united labors of our whole profession can be concentrated in that great work that is before us—the amelioration of human suffering, the conservation of human teeth, the re-establishment of the normal physical condition of man.

While our profession was in its infancy and childhood, and the knowledge and acquirements of those pursuing it were limited, the responsibilities were light to a corresponding degree; but as, with the rapid and enormous advances made, wide fields of knowledge were opened to us and great floods of light were poured in upon us, our responsibilities have grown and increased, until now they stand before us in that solemn aspect which makes us the keepers of our brother, the conservators of his general physical wellbeing, and even the custodians of his life; for we have reached that point where our investigations and studies, and consequently our practice, can no longer be confined to the oral cavity, but must embrace the whole human system in all its varied organisms, and weigh the influence of external relations and circumstances. Our search for causes will carry us back to former generations, and the good effects of our labors should be felt by the descendants of those who place themselves under our care.

Who of us can look at the imperious duties of our position without trembling at the magnitude of its responsibilities?

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Yet our profession has thus far to a great extent been equal to the demands made upon it. Its members may have been slow in understanding what was required; for it must be remembered that they not only found an existing condition of disease and decay of the teeth, but that the factors of that disease and decay have been and are continually changing in their proportions and combinations, thus rendering the investigation more complicated; yet whenever a phase, before unknown, has presented itself, active minds and ready hands have been found to grapple with every problem, and through them we are daily gaining ground in our search for the causes and cure of diseases of the mouth.

Here arises a pertinent question, which each member of our profession should ask himself honestly and answer sincerely; for as all organizations and communities, large or small, are made up of individuals, so individual action must determine the result of the labors of the whole, and no individual can delegate his responsibilities and duties to another. The question is, "Am I enlisted in the ranks of these earnest workers and doing my duty according to my ability, or am I leaving to others the task of doing that which the responsibilities of my position require of me?" This question asked and answered with a sincere desire to ascertain what the duties of each individual are, and to discharge these duties conscientiously, would, I am sure, add largely to the number of these earnest workers.

Gentlemen of the Dental Association of Maryland and the District of Columbia:—There are times in the life of every one that are marked with feelings of peculiar pleasure and pride. This is to me one of those times, made so by your act in selecting me as your presiding officer. For this mark of your esteem and preference I tender to you my sincere thanks. I have endeavored to show my appreciation of this high honor by discharging the duties of my office to the best of my ability. My shortcomings in that respect during the past year I ask you to overlook. For the few days that yet remain before I surrender my trust to my successor, I crave your indulgence and kind assistance, with the assurance that in the future as in the past, I will still labor as much as in me lies for the promotion of the interests of our profession as founded upon the principles of honor, truth and science.

Mr. President of the American Dental Convention, and Mr. President of the Southern Dental Association:—I feel that I can extend to you and to the members of your organizations present, the assurance that the words of welcome that you have heard to-day, come from hearts warm with respect, esteem and love for our co-laborers in the great work that has brought so many of us together here to-day, from nearly every

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section of our country. Let us hope that our assemblage on this occasion is a prefiguration of the Association alluded to in the remarks of the President of the American Dental Convention, in which all jealousies and unfriendly feelings, from whatever cause, will be laid aside, and the members of our profession, from every part of our great country, will be united in one grand and continued and untiring effort for the common good of our whole race.

At the close of these addresses Dr. Atkinson, the President of the United Meeting, announced the reading of the proceedings of last year to be in order.

The reading of the proceedings of the American Dental Convention was postponed to a future session.

This being a called or special meeting of the Southern Dental Association, the proceedings of that body were not read.

The reading of the proceedings of the Dental Association of Md. and D. C. was dispensed with, as they had been printed, and were in the hands of the members.

On motion, the United Meeting adjourned, to reassemble at 4 o'clock P. M.

Afternoon Session, First Day.

August 14th.

Pursuant to adjournment, the United Meeting reassembled at 4 o'clock.

Dr. T. S. Waters, on the part of the Executive Committees, submitted the following, which was adopted:

The Executive Committees propose that when any business, affecting specially any one of the three bodies now in united meeting, is under discussion, it shall be transacted by the officers and members of that body, the meeting at all other times being under the presidency of Dr. Atkinson.

They submit the annexed list of officers and general order of business, and recommend that a sufficient number of copies be printed for the use of the members.

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They also propose the following hours of meeting:—Morning Session, 10 A. M. to 1½ P. M. Afternoon Session, 4 P. M. to adjournment. Night Session, as from time to time decided.

AMERICAN DENTAL CONVENTION.

OFFICERS:—*President*, W. H. Atkinson, New York. *Vice-President*, J. R. Walker, New Orleans. *Corresponding Secretary*, G. A. Mills, Baltimore. *Recording Secretary*, Ambler Tees, Philadelphia. *Treasurer*, J. G. Ambler, New York.

EXECUTIVE COMMITTEE:—R. B. Winder, Baltimore; H. Townsend, Philadelphia; W. M. Reynolds, New York; G. A. Mills, Baltimore; L. H. Delange, Camden, N. J.

SOUTHERN DENTAL ASSOCIATION.

OFFICERS:—*President*, S. J. Cobb, Nashville, Tenn. *1st Vice-President*, A. C. Ford, Atlanta, Ga. *2d Vice-President*, A. F. McLain, New Orleans. *3d Vice-President*, J. B. Patrick, Charleston, S. C. *Corresponding Secretary*, W. L. Dismuke, Nashville, Tenn. *Recording Secretary*, E. S. Chisholm, Tuscaloosa, Ala. *Treasurer*, H. A. Lowrance, Athens, Ga.

EXECUTIVE COMMITTEE:—L. D. Carpenter, Atlanta, Ga.; J. G. McAuley, Selma, Ala.; J. G. Angell, New Orleans.

DENTAL ASSOCIATION OF MARYLAND AND DISTRICT OF COLUMBIA.

OFFICERS:—*President*, R. Finley Hunt, Washington. *Vice-President*, B. F. Coy, Baltimore. *Corresponding Secretary*, R. B. Winder, Baltimore. *Recording Secretary*, H. C. Thompson, Washington. *Rep. Secretary*, F. F. Drew, Baltimore. *Treasurer*, J. Curtiss Smithe, Washington.

EXECUTIVE COMMITTEE:—T. S. Waters, Baltimore; M. W. Foster, Baltimore; H. B. Noble, Washington.

ORDER OF BUSINESS FOR FIRST DAY.

1. Prayer by Rev. Dr. Bacon, of Oakland.
2. Address of Welcome by Dr. Nelson, of Frederick, Md.
3. Address of the Presidents.
4. Reading of Proceedings.
5. Announcement that Members of each Association have all the privileges of the floor and not required to join more than one organization.
6. Election of Members:—1st. A. D. Conv.; 2d. S. D. A.; 3d. Md. and D. C. A.
7. Miscellaneous Business.
8. Reading of papers and discussions—all papers on any one subject to be read before the subject is passed.

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GENERAL ORDER OF BUSINESS FOR EACH DAY.

Prayer.
Reading of Minutes.
Election of Members in order.
Reports of Business Committees.
Miscellaneous Business.
Reading of Papers and Discussions.

SPECIAL ORDER OF BUSINESS FOR LAST DAY.

Prayer.
Reading of Minutes.
Election of Members in order.
Reports of Business Committees.
Miscellaneous Business.
Reading of Papers and Discussions.
Reports of Executive Committees.
Reports of Publication Committees.
Election and Installation of Officers.
Adjournment.

Dr. Atkinson announced that any one present who is a Dentist, or connected with the profession, can become a member of the American Dental Convention by paying to the treasurer the admission fee and enrolling his name, and requested those desiring to become members to do so.

There were no propositions for membership in the Southern Dental Association.

Drs. J. B. Hodgkin and B. M. Wilkerson, of Baltimore, were elected active members, and Thos. B. Evans, M. D., of Baltimore, S. Waterman, M. D., of New York, E. H. Bartlett, M. D., and J. L. McComas, M. D., of Oakland, were elected honorary members of the Dental Association of Md. and D. C.

DR. HUNT presented the following report to the Md. and D. C. Dental Association:

The officers of the association, in conformity with a resolution adopted at the last annual meeting, present for your consideration the following revision of the Constitution.

They have made no material amendment except in relation to the Sections substituted for the Committees, and to the free scholarship in the Maryland Dental College.

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CONSTITUTION.

ARTICLE I.—*Name.*

This organization shall be known as the *Dental Association of the State of Maryland and District of Columbia.*

ARTICLE II.—*Objects.*

It shall be the object of this Association to promote the best interests of the profession, to encourage a friendly intercourse among the members, to develop dental literature, to educate the public to a proper understanding and appreciation of the necessity of skilful dentistry, and to assist in elevating the standard of dental education.

ARTICLE III.—*Membership.*

SEC. 1. This Association shall consist of active and honorary members.

SEC. 2. Active members shall be honorable practitioners of dentistry in the State of Maryland and District of Columbia, elected by a three-fourths vote, by ballot only, after having been proposed by a member of the Association. They alone shall be entitled to hold office, and vote on questions affecting the finances and government of the Association.

SEC. 3. Members of our profession residing in other jurisdictions, members of the medical profession, and others engaged in scientific pursuits, may become honorary members on being proposed by an active member and receiving a unanimous vote.

ARTICLE IV.—*Fees and Dues.*

SEC. 1. Before taking any part in the proceedings, each member elect must sign this Constitution, pay a fee of three dollars ($3.00), and subscribe to the By-Laws and Code of Ethics.

SEC. 2. Each member shall pay an annual fee of three dollars ($3.00) before participating in the proceedings, and an additional assessment may be made by those present, when deemed necessary, by a majority of two-thirds.

SEC. 3. Honorary members shall be exempt from the payment of all dues and fees.

SEC. 4. The Treasurer shall erase from the roll the names of all members who are in arrears for dues for two years, after having given such members due notice in writing of their arrearages.

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ARTICLE V.—*Time of Meeting.*

This Association shall hold its meetings annually, commencing at the hour of eleven (11) o'clock A. M. on the —— of ——, in each year, in the cities of Baltimore and Washington alternately, unless some other time and place should be agreed upon during the preceding meeting, by a majority vote.

ARTICLE VI.—*Officers.*

SEC. 1. The Officers of this Association shall be a President, Vice-President, Corresponding Secretary, Recording Secretary, Reporting Secretary, Treasurer, and Executive Committee, who shall be elected by ballot without nomination, and a majority of all the votes cast shall be necessary to a choice. The candidate receiving the smallest number of votes shall be dropped after each ballot. The election and installation of officers shall immediately precede the final adjournment. Each officer shall hold his position for one year, or until another is elected to succeed him.

SEC. 2. The President shall preside according to parliamentary usage and the rules adopted by the Association. He shall appoint all Committees not otherwise provided for.

SEC. 3. In the absence of the President, the Vice-President shall preside, and in the absence of both these officers, a Chairman *pro tem.* shall be appointed by a majority vote.

SEC. 4. The Corresponding Secretary shall have charge of the correspondence of the Association, and keep the same on file for the use of the meeting.

SEC. 5. The Recording Secretary shall keep accurate minutes of the proceedings of the meetings, preserve all archives and papers of the Association, and attend to all other duties pertaining to his office. He shall be, ex-officio, Chairman of the Publication Committee, and see that due notice is given to the members of the time and place of each meeting of the Association.

SEC. 6. It shall be the duty of the Reporting Secretary to publish through the press such items of the proceedings of the meetings as the Executive Committee may deem most instructive and beneficial to the public.

SEC. 7. The Treasurer shall keep all moneys belonging to the Association, and render an accurate account at each annual meeting of the condition of the finances. He shall attend the meeting of the Executive Committee on the morning of the first day of the annual meeting to receive dues. He shall restore such names as may have been erased, upon payment of dues within the legal limits, and shall notify all whose names may be erased from the list of membership. He shall

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pay all drafts drawn by the President and countersigned by the Recording Secretary, and shall report to the Executive Committee, which Committee shall audit his accounts, and present his report, together with their own, to the Association during the meeting.

ARTICLE VII.—*Committees.*

SEC. 1. The Executive Committee shall consist of three members, and shall attend to all business of the Association not otherwise specially provided for. They shall procure the services of a clergyman to open the meetings with prayer, provide suitable accommodations for the meetings and clinics, arrange for the exhibition of all dental appliances presented, it being their duty to take charge of the same, and shall submit a general report of the same during the last day of the meeting.

SEC. 2. In addition to the Executive Committee there shall be two other Standing Committees, viz., the Publication and the Education Committees.

SEC. 3. The Publication Committee shall superintend the publication and distribution of such portions of the transactions of the meetings as the Association may direct. They shall, in their annual report, state the cost of the publications of the Association during the year, the amount of printed matter on hand, and how much has been distributed to members.

SEC. 4. The Education Committee shall report to the Association at each annual meeting the names of candidates for the free scholarship in the Maryland Dental College, from which candidates the Association can select one for the ensuing session of said College, provided always there is at the time a vacancy in said free scholarship.

ARTICLE VIII.—*Sections.*

SEC. 1. The members of this Association shall be divided into ten Permanent Sections, each of which shall have charge of one of the following divisions of subjects, and, through its Chairman, or such other of its members as it may select, report upon the same to the Association at each annual meeting.

1. Anatomy and Physiology.
2. Histology and Microscopy.
3. Etiology and Pathology.
4. Diagnosis and Therapeutics.
5. Chemistry and Materia Medica.
6. Metallurgy and Chemistry of the Metals.

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7. Anæsthesia and Anæsthetics.
8. Surgical and Operative Dentistry.
9. Artificial Dentistry.
10. Dental Literature and Education.

SEC. 2. Each Permanent Section shall be composed of such members, active and honorary, as may elect to unite and form such Section.

SEC. 3. The members of each Section shall, at some time during each annual meeting of the Association, elect a Chairman and such other officers as they may see fit, whose duty it shall be to see that the labors of the Section are conducted in such manner as to secure the best results.

SEC. 4. It shall be the duty of each member of the Association to connect himself with some one of these Sections, exercising his own option as to the particular channel in which he will labor. He may, if he so desires, be a member of two or more Sections.

SEC. 5. It shall be the duty of the Chairman of any Section to furnish the latest and best information in the possession of his Section upon any subject connected therewith, to any member of another Section who, through the Chairman of his own Section, may apply to him for such information.

ARTICLE IX.—*Quorum.*

Eight members shall constitute a quorum for the transaction of business at any meeting of this Association.

ARTICLE X.—*Delegates.*

This Association shall receive one Delegate from each Dental Association or Society, and also one Delegate from any corporate Dental Organization, who shall pay the same fee as other members, and shall have all the privileges of the floor as members, except the privilege of voting on financial questions and questions involving a change of laws, and shall be entitled to the published transactions the same as other members.

ARTICLE XI.—*Impeachment and Trial.*

Any member may impeach another for violating his pledges to this Association, or for unprofessional or ungentlemanly conduct, by preferring written charges against him, the same, after being read to the Association, to be placed in the hands of an investigating committee of three or more, whose duty it shall be to report thereon to the Association; a majority of votes of the members present being necessary for reprimand, two-thirds for suspension, and three-fourths for expulsion.

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ARTICLE XII.—*Amendments.*

No alteration or amendment shall be made in the Articles of this Constitution, except with the consent of three-fourths of the members present at an annual meeting subsequent to that at which such alteration or amendment may have been proposed in writing, or by the unanimous consent of all the members in attendance at the meeting at which said alteration or amendment is proposed.

R. FINLEY HUNT, *Pres.*
B. F. COY, *Vice-Pres.*
H. C. THOMPSON, *Rec. Sec.*

After the revised Constitution had been read and considered, each Article and Section separately, it was, on motion of Dr. Donaldson, adopted as a whole.

A motion by DR. WATERS was adopted, that a joint committee of three be appointed to examine and report on dental instruments and appliances, on exhibition at the hotel, by the houses of S. S. White, and Johnston Bros. & Selby; and Dr. J. R. Walker, of the A. D. C., Dr. J. Taft, of the S. D. A., and Dr. J. C. Smithe, of the Md. and D. C. D. A., were appointed on that committee.

DR. FORD then read an essay on Dynamic or Vital Forces, prepared by Dr. E. Parsons, of Savannah, Ga., a member of the S. D. A., for that body.

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DYNAMIC OR VITAL FORCES.

The rapid advance in almost every department of human knowledge, renders it important that the Dentist of to-day should have a far more intimate acquaintance with almost all the modern sciences than has heretofore been thought necessary. The laws by which life and death operate to produce all their varied phenomena, ever have been, and ever will be, of the greatest interest to the scientist and the philosopher. The most advanced thought on this subject may be satisfactory to the superficial observer, but to others it is only a stimulant to know more. It is not my purpose in what I have to say on this subject to even attempt to account for all the various idiosyncrasies manifested in these degenerate times; but rather, with your permission, to cast my *mite* into the great knowledge-box of this Association. First let me premise, that it is by the law of opposites that we can learn the true character of anything, and by comparison we can weigh in our mental balance the good and the true, or the evil and the false, and thereby prepare ourselves for the duties of life.

Life—what is life? I hold it to be a living, active principle, not created, but given, manifesting itself by means of motion. We observe three kinds of motion, spiral, circular, and angular. Spiral for the nervous system, circular for the blood and secretions, and the angular is manifested in every act of our lives, as there can be no manifestation of life without motion. Let us briefly consider the origin, nature and the use of motion.

As all change is effected by means of motion, is it not fair to infer that all creation was brought into existence by the same means. Be this as it may, it is not in the power of the imagination to conceive of the existence of, or the creation of, a thing without motion. This being the first law of life, it is of vast importance to our profession to thoroughly understand it. No man can scientifically apply a remedy for a diseased tooth, or any other organ, unless he can with certainty anticipate the effect. All else any charlatan can do, and it is, at best, a leap in the dark, a mere experiment.

All the modern experiments in animal magnetism demonstrate beyond a doubt that, physically considered, we are magnetic machines, and every organ in the body is polarized. We cannot crook a finger or do the least thing if the magnetic current is not obedient to the *will*, unless it be some spasmodic action, a struggle between life and death. Some may say,

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what has the knowledge of the philosophy of *life*, *motion*, and magnetism to do with the practical uses of Dentistry? Allow me to say, every individual has a sphere or vital force peculiar to himself; and every Dentist of experience must have observed that it is much more fatiguing to operate for some patients than for others. This difference is easily accounted for if we understand the *modus operandi* of these vital forces. When the two magnetic spheres of patient and dentist are brought in contact, the weaker will always draw on the stronger; but what is vastly more important is, when a patient calls on us for advice, that we be able to correctly *diagnose* the case, and have a full knowledge of the appropriate remedy, not only for relief, but for permanent cure. The habits of civilized society, as we now find them, are a fruitful source of disease, and temperaments are very much compounded, making it sometimes very difficult to determine the healthy balance between the external and internal magnetic forces. Without this knowledge we cannot give such directions as will ensure our services to be a permanent success. Some may boast of a universal success: this is all braggadocio. I have no respect for such pretenders. The best dentists I have ever known (and I have known many in my forty years' practice), after exerting all their skill, would sometimes meet with miserable failure.

I have said that every organ is polarized, and the pulp of a tooth is no exception to the rule. All metallic substances used in filling teeth are more or less actively magnetic. Either gold by itself, or lead by itself, has the least magnetic action, and is therefore the least likely to disturb polarity. The amalgams, used so much in our day, are strongly magnetic, and are highly injurious in some mouths, while in others they are as good as any that can be used for a permanent filling. To understand this variation, that we may do good and avoid injury, we must be well acquainted with the magnetic internal and external forces; if the internal is too active for the external, you will find acidulated secretions, but if the latter predominates, the secretions are reversed, and a predisposition to the accumulation of tartar is the result. It may be asked, how are we to know these varied conditions before we proceed to our work? I reply, by studying more thoroughly the laws which govern the animal economy in both the normal and abnormal states. Is a practical illustration of our principles desired? We will suppose a case. A patient applies for relief from suffering; on a careful examination, you find a valuable tooth in a condition that it must either be extracted or the pulp devitalized in order to give relief; you prefer the latter, and you resort to the use of the common remedy, arsenic, to effect your object. Can you tell me why it is any more efficient

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than so much chalk? Do you say that experiments with them demonstrate the difference? If this is all, you have no scientific knowledge on the subject whatever, any more than the most ignorant negro cook has of the laws of chemistry in making a good griddle-cake! Do you pretend to be scientific? Tell us how arsenic acts on living vital tissue. In the Dental Cosmos, Vol. XIX, No. 7, page 338, Dr. Flagg, one of our best physiologists, says, "Arsenic acts as a dynamic irritant, causing a determination of blood"; I suppose he means congestion. Does this explain what that power is that is inherent in arsenic and not in chalk? Admit the great fact that no change can take place without motion, and we shall begin to understand the difference between chalk and arsenic. The first is relatively inert, the latter is inherently intensely active, and needs only to be brought in contact with living tissue to develop its abundant power to destroy polarity; and when this is either destroyed or reversed, all sensation ceases; when reversed, a lethargic state is induced; when destroyed, death ensues. In our present state of ignorance, we cannot demonstrate the different inherent properties of different substances except by experiment; but I have no doubt the time will come when instruments will be invented of sufficient ability to demonstrate the inherent properties of all material substances. Until then we must be content to occupy the position of experimental scientists, and like all other experimenters, meet with many failures.

Let us not be discouraged if we cannot arrive at perfection; we may approach it. It was by observation and reflection, and also by continual new inventions, that the use of steam has been brought to its present state of perfection; and yet the best engineer has yet much more to learn to insure his own and others' safety. The process of converting water into steam is nothing new; but the best mode of utilizing it is being constantly improved. Its expansive power can be definitely estimated; but when converted into gas by overheating, no one can calculate its expansive power with any degree of accuracy, for the strongest steam-boiler offers no more resistance to its force than would a paper bag.

Excuse this digression; I only wish to show, that if we were better informed, detriment to our reputation and to our patients' welfare would be greatly lessened. If I had the ability to elaborate this subject of the vital forces as it truly merits, I have not time now to do so.

In conclusion, allow me to say that so large a portion of our labors being purely mechanical, it is not strange that the best minds in our profession have been directed to the invention of instruments and appliances to facilitate and better perform dental operations. This is highly commendable, but it is not

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enough. Certainty of success is demanded of the dentist, but from the physician it is only hoped for; therefore our knowledge of cause and effect should be of the highest possible attainment. There are some men in every department in life that, with more *brass* than *brains*, would fain make the public believe that they have attained perfection in their art or calling. All such with us are mere imitators, and do nothing to advance, but rather retard the true interest and dignity of our profession. What we most need now is, not so much improvements in art as in judgment—to know when, and how, to apply our remedies to ensure the greatest possible benefit to our patients. This, in my opinion, can only be accomplished by a better understanding of the laws of motion, by which means all change in physical condition is effected. Hoping that this subject may receive more marked attention from our Dental Associations, I offer these few remarks as a stimulant to the discussion and investigation thereof.

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Dr. Atkinson, being called on by Dr. Taft, after the reading of this paper, said:

Mr. President and Gentlemen:—I regret that a paper looking so much in the right direction, should seem to interest you so little as to not call for investigation, for commendation or condemnation. There is one point in the paper that is well worthy of attention, and that is, that we are more able to do than we are to understand when to do and why to do the works of diagnosis, of execution, and the means of restoring the lost health of parts. That is true; and probably it is unfortunate that this paper should happen to fall at a time when we are not quite awake. For some reason there seems to be a sort of lethargy over the minds of the body, and they do not seem to be very hungry for that kind of food. When we speak upon the subject of dynamics, we are involved in a very deep question. Power is that energy by which all modes of motion are operated, and it is simply a specification of that power. This question is large enough to keep us our whole time. It is precisely as if we were talking about infinite things. If we can think at all, we know there must be infinite because there are finite. Then we have these infinitive modes of other minds. It is because we have received these things through inspiration, and not through the natural, that makes such unwillingness on our parts to receive the truth.

This subject was passed, and the United Meeting decided that in calling for papers it would be guided by the order in which the various subjects appear in Art. VIII. of the Constitution of the Md. & D. C. Association (q. v.)

The subjects being called in that order, a paper on Embryology, presented by Dr. Atkinson, was made the special order for to-morrow morning, 15th inst.

Dr. Waterman's paper on the Spectroscope was made the special order for Thursday morning, the 16th inst.

A letter was read from Dr. Fouke, of Westminster, Md., regretting that he could not be present, and saying that he had prepared and forwarded a paper, for the Md. & D. C. A., on Mechanical Dentistry. (This paper has not been received.)

The other subjects were passed for the present.

The United Meeting then adjourned.

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OAKLAND, *August 15th*, 1877.

During the morning hours before the sessions there was a clinic by Dr. Coy, of Baltimore.

MORNING SESSION, SECOND DAY.

Pursuant to the order of business, the United Meeting was called to order at 10 o'clock, the presiding officers in their chairs.

The Minutes of yesterday's sessions were read and approved.

Dr. Geo. B. Welsh, of Washington, D. C., was elected an active member of the Md. & D. C. Association.

A letter was read from Dr. S. J. Cobb, of Nashville, Tenn., to the S. D. A., regretting his inability, on account of ill health, to be present, and expressing his warmest wishes for the success of this combined meeting.

Dr. Atkinson then read his paper, which had been made the special order for this hour, on Embryology, prefacing its reading with the following remarks:

I wrote this paper under the conviction of a pressing need, especially among Dentists, for more minute perception of the principles and laws that lie at the foundation of organization and morphology in general. Having written it under inspiration, and knowing it to consist of statements that are involved and concentrated, I cordially invite any one who does not follow me, to ask me to repeat or explain, at a comma, colon, semicolon, period, paragraph, or at the end of the paper. And this I do honestly, hoping that I may be met with the same honesty of purpose to get at the truth, irrespective of the allegiance that we hold ourselves bound to, towards those who have preceded us in this occult investigation.

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EMBRYOLOGY.

A complete understanding of Embryology involves the comprehension of the processes of nutrition, whereby parent bodies become possessed of a plus quantity of well-elaborated nutrient material to enable them to project buds, the shedding and coalescence of which constitute the semens from which, when these flow together under favorable circumstances, embryos result. The elaboration of the seminal mass and the egg consists of an adequation of molecular tensions, or the record (storing up) of the atomic experiences in combination with, and separation of, the atoms in producing the molecules of which the food consists, from which the semen is derived as the resultant of a complicated series of digestory and secretory processes.

Naturalists have observed from the earliest times that "like begets like," and "unlike begets difference," wherever germs result from the admixtures of semen and egg, or male and female semens derived from well nourished bodies. That which we call inheritance is none other than the recorded psychical and molecular experiences of the parents preserved in the semens. The reawakening of this "past molecular experience" of the parents, is the basis of development of the progeny, wherever it is free to express itself. The simplest form of parentage that we are acquainted with consists in the flowing together of atoms, which conceals their identity, in the molecules they constitute as progeny, by the mergence of their atomic presence into molecular mass. From this starting-point of parent and progeny, we gradually rise through various stages, complications, and refinements in molecular changes, until the parent is able to produce a progeny without losing its own identity.

Molecular metamorphoses have many degrees of interblendings in the tension of bonds which constitute ripeness of the mass, in an equation of the satisfaction of the desire to unite, from the lowest and simplest pabulum to the highest and finest semen. The first is exampled in water; the last in the dual presentment of animal spirit in the gray matter of the cerebrum and cerebellum, as the copulative basis of thought and feeling, consciousness and physics, or mind and its medium.

The molecular mass with which we have to do in the study of Embryology, is derived from the food upon which the parent bodies subsist, by a process of digestive metamorphoses, which adapts it to the necessities of the tissues to be supplied with

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the elements of growth and maintenance. The materials of food, their preparation, and the surrounding circumstances under which it is eaten and digested, are important items in the production of the pabulum upon which the tissues are fed or starved. That which has been called over-feeding may be starving, by reason of the interference with the blood-making and force-generating apparatus. Many mothers are starved during pregnancy both in body and soul, and many fœtuses are, on the other hand, starved by reason of misdirection of nutrient currents in the pabulum through bad habits of the mother. These derangements are attributable to a variety of incidents: want of quantity or quality of food supply, inharmonious associates during digestion and gestation, are examples of physical and moral antecedents of imperfectly elaborated pabulum, and illy-gestated progeny.

All the secretions are under the law of reflex nervous incitement, and therefore partake of the nature of the source of the exciting impulse, thus *di*vinizing or *de*vinizing the product of the secretory apparatus all the way from saliva to semen, in testes, ovary, and brain. These potentialities are stored in the secretions, and only await the opportunity to display themselves.

That the character of a secretion partakes of the nature of its exciting circumstance, is proved by the quality of the saliva being different in diverse states under which it is produced. Pleasant states of mind induce alkaline saliva; angry persons secrete acid and viscous saliva, or are unable to secrete from these glands at all. Sugars and starches demand alkaline saliva, while nitrogenous substances have next to no power to invoke other than a neutral saliva.

The presence of persons has an unconscious influence upon our secretions, and hence influence us on the plane of mere vegetative, involuntary, or "unconscious-consciousness," or "molecular-consciousness," thus modifying our physical and moral states before we are aware of it. Our natural likes and dislikes are indices of these states, and we should heed them if we would be healthy ourselves, or produce healthy and well developed progeny. The old saw, "Everybody loves a lover," is the testimony of the ages to this doctrine of "impartation" of our condition to those within our "sphere of influence." Mere *personal presence* often *heals;* and alas! it sometimes *hurts* almost irreparably, because of the occultness with which its malign force operates. Who has not witnessed sunshine and joy irradiate a company upon the entrance of one full to overflowing with life and hope; and who has not seen the shades of sadness and shrinking seize a company of happy souls, upon the advent into its sacred precincts of a well-known and dreaded "Kill-Joy," who has determined

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within his unhappy self, "If I cannot be thus joyous, neither shall you!" and until that dark spirit has been expelled, who has ever seen health and peace prevail as was its wont? How many of us are ready to acknowledge that our real life "is hidden in truth in the unseen realms" of our interior-posterior brain and ganglionic system of nerves, more than it is in our exterior-anterior superior brain, where we but record and arrange the perceptions spontaneously given by the interior gray cells of the cerebellum and sentient neural system?

Whether ready to acknowledge it or not, we are, as embryos and adults, much more at the mercy of surroundings and registered "past experiences" of ancestry than our egotism leads us to accept. Could all these past experiences be plainly set before our present perception, we would be in the possession of the values of all the changes of integration and disintegration of the elements of mental and bodily machinery. But such has been the loose habit of observations in this direction, that we have actively retained in our surface memory the merest fraction of the experiences through which we have passed, and we are thus induced to claim for ourselves a degree of freedom and responsibility by no means justified in the history of our embryonal and adult experiences. Were we to assert that consciousness never loses any of its experiences, we might be answered by a denial of the truth of the assertion, and be required to justify its verity by a recapitulation of the entire series of our past experiences, which could only be done by a reference to the multitude of items in the experiences involved in any history, or consume as much time in the statement as was formerly occupied in the enactment of this history.

Of the three distinct sets of currents which constitute adult somatic functions, two only are well pronounced in intra-uterine development. These are called neural currents and vascular currents, and they depend for their continuance upon the exercise of the other set of currents referred to above, called respiratory currents. All together they are called "Bichat's tripod of life."

These two sets each consist of a triple series of elements. In the neural currents we have, first, afferent, second, efferent, flowing into a third current in the neural sea of the embryonal mass. The elements of the vascular series are arterial, capillary, and venous currents in continuous connection, which completes the vascular circuit. The propagation of these currental gyres in the fœtus depends upon the respiration of the mother. The *pre*dominant impulses of the respiratory movements of the chest are *sub*dominantly propagated by incitement of nervous currents in the neural, vascular, digestory, and nutrient machinery, and would soon terminate, or come

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to a state of rest, were they not sustained by the repetition of the respiratory acts. The proof of this is at hand, as witnessed in the increased rapidity of the breathing following and agreeing with increased voluntary movements, mental or bodily. . . . .

In embryology, as in other fields of study, continued and repeated observations tend to correct and supplant the descriptions of former observers, to such extent as to embarrass those who endeavor to follow the authors of any particular period, without being conversant with the whole line of observation and record. These developments have been going on since Aristotle with his "punctum saliens" (now "vascular area"); Fabricus and his "cicatricula" (now "blastoderm"); Harvey's "eye of the egg," and "colliquamentum" (now "blastoderm"); Wolfe, who laid the foundation of modern embryology and modern physiology, with his "vis essentialis"; Haller's "organized concrete"; and Doellinger, who induced Pander to take up the study of the fecundated hen's eggs, who gave us his "blastoderm" and the three "embryonal layers" or "embryonal sheets" called serous, mucous, and vascular, (now modified into "epiblast," "mesoblast," and "hypoblast").

All these taken with Von Baer's statements and scholia, through which he interprets the morphological significance of embryological facts, are of great and lasting importance. Since his time these rectifications have continued through the labors of Rémak, Rathke, A. Thompson, and others, till we come to Kölliker and confreres; and they are now undergoing renewed elucidation and annotation at the hands of Foster and Balfour, through whom we look for great advances and rectifications of our conceptions of embryological processes, when they shall have completed and published their work on "The Elements of Embryology," in three parts, the first of which is before the profession already. By all these helps and direct practical observations, we learn that the blastoderm in the egg of the hen divides as follows: into, first, the "opaque area," and the "pellucid" or "transparent area"; second, between these the "vascular area" arises from the mesoblast, which comes from "formative cells" which emerge into sight in the "pellucid area" at the edge of the "hypoblast," which is here separate from the "epiblast," while it at first is in close contact everywhere else. When the accumulation of these "formative cells" becomes considerable, the "mesoblast" splits into the "somatopleure" above, and the "splanchnopleure" below, the first being subsequently differentiated into body-walls, and the second into splanchnic-walls, or visceral walls. From foldings and reduplications and closings of these folds and duplicatures, the tissues and the organs of the whole body arise. The embryo forms in the border-land of disputed

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dominion between the "opaque" and "pellucid" areas, ever emerging from the perfectly transparent "zona pellucida" in the form of a nebulous fleck of milky cloud-mass, as the first sensible indication of its presence and proportions. The "area opaka" is superposed upon the "area pellucida," forming at first a perfect circle, or flattened disk, that steadily enlarges and elongates by excess of increment of growth near opposite edges of this circle, where the future head-fold and tail-fold mark the points of most rapid increase of the blastoderm; changing its rounded disk form to an ovoid, constricted, bulbous cylinder, and then to an irregular, recurved figure, now cognisable as the elongated body of the embryo. The morphological changes of generation and replacement of the deciduous embryonal bodies and processes that constitute the intra-oval development of the machinery of function, are too complicated, manifold, and occult, to admit of consecutive delineation of detail in demonstrable clearness, within the limits of a paper such as this, and the time at command. Suffice it to say, that the next stage of embryonal development consists in the appearance of masses of formative corpuscles, which rapidly accumulate on the inner face of the "somatopleure," and immediately chop up into the "proto-vertebræ"; beginning at the site of the future third or fourth cervical vertebra. This chopping up now proceeds from this point toward both ends of the vertebral column, each division serving as a fore-step in the formation of tissue, by laying out the "proto-vertebræ" successively into "bone-plates," "muscle-plates," and "nerve-plates," from which, by a series of metamorphoses, the bones, muscles, and nerves are developed and correlated together as the perfected body of the fœtus.

The behavior of the splanchnopleure in the production of the viscera of the fœtus, consists of a less complicated series of steps to effect the production of the blood-making apparatus. Instead of being chopped up into masses of formative corpuscles and into proto-vertebræ which differentiate into bone-plates, muscle-plates, and nerve-plates, as occurs in the somatopleure, the differentiation of the splanchnopleure into digestory, circulatory, and respiratory tracts, consists of a series of foldings or duplications of the circular sheet (splanchnopleure), the closing in of which at the two ends marking the head-fold and the tail-fold of the splanchnopleure, produces the two blind ends or *cul-de-sacs*, called the fore-gut and the after-gut, in simple cylindrical form, reaching toward each other with trumpet-like presentment of calibre, the back edges of whose lips fuse together and join the fore-gut and after-gut in one continuous membrance, while the lower border of the trumpet-like lips of the forward and after *cul-de-sacs* unite, presenting a large hernia-like, or limb-like, bulging,

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balloon-shaped stalk, connecting the fore-gut and after-gut in one continuous, irregular, tri-lobed, sausage-like cylinder. The neck of this last formed pendulous, pear-shaped portion that embraces not only the pellucid area but the entire yolk, or vitellus, is named the splanchno-stalk. On either side of the fore-gut a process of budding swells out, producing the foundation of the right and left future lung, by which the fore-gut becomes contracted at the territory between these two growing bodies. Below this point of contraction the calibre of the gut enlarges abruptly and considerably, sending out on one side a proliferation of a considerable mass to lay the foundation of the future liver, and at the lower end of this enlargement another mass of formative corpuscles destined to be metamorphosed into the pancreas. The end-gut or after-gut is developed in the direction toward the fore-gut, and by a series of reduplications of its calibre becomes differentiated into the rectum, colon, ilium, and jejunum, to join the duodenum, and thus complete the digestory tract, or "*prima via.*"

An accumulation of formative corpuscles arises in the mesoblast near the site of the hind-gut, called the "*genital ridge.*" From a furrow, duplication, or fold in this mass, "Muller's duct" arises, that becomes differentiated successively into "Wolfian duct," "Wolfian body," ureter, and kidney. Sometimes the "Wolfian duct" opens into the cloaca separately from the ureter, and at others by a common mouth. These ducts are at the first solid rods of formative corpuscles, and afterward are perforated by an endotheliated, almost indistinguishable tube; the future excretory "Wolfian duct," or ureter. A further tumulus of formative corpuscles projects from the epithelial surface of the Wolfian bodies, which lays the foundation of the genital apparatus; in the female, called "par-ovarium"; in the male, the "par-epididymus" of Henle, and the "paradidymus" of Waldeyer, the so-called homologa of each other.

Embryologists are still in doubt as to the regularity of the specializations of the embryonal bodies that are worked into the folds and differentiations of folds. This is evidenced by their persisting in disputing as to the mesoblastic and epiblastic elements continuing to act in the somatopleure as distinctly epiblastic or mesoblastic; and also in denying that the splanchnopleure can act as a body which conjoins the mesoblastic and hypoblastic function by proliferating the mesoblastic and hypoblastic elements as such, and not as the product of the compound body definitely named splanchnopleure, from which the parenchyma and the epithelium of the viscera arise. The blastoderm has bi-laminar, tri-laminar, and quadri-laminar aspects at the varying stages of the differentiations

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into epiblast and hypoblast, between which the mesoblast is introduced, soon to split into the bilaminar membranes somatopleure and splanchnopleure, which is a quadri-laminar sheet immediately before splitting into these bi-laminar sheets.

With your permission I will now close this paper in the language of another, as taken from an essay entitled "The New Body and the New Birth."

At his first birth MAN is a helpless animal, whose members and faculties are held together, and whose actions are directed by SELF-LOVE, the love whose chief aim is to *get* good. Out of SELF-LOVE gradually grows SOCIAL LOVE; which aims to *confer* pleasure and to *do* good from mixed motives, one of which is vanity, or the wish to be admired. Next in order of development is DIVINE LOVE; which seeks the good and feels the good of others from a divine joy or sympathy in the welfare of others. This holy love or sympathy gradually brings man into sympathy with God.

In proportion as a man's soul is filled with Divine Love, it lives in the good that it does to others, or that it sees other vital organisms enjoy. True marriage (which implies fidelity to the trusts and obligations that belong to marriage), is the main entrance to Divine Love. Marriage gives to man a body, composed not of will-bound atoms, but of free persons, or of wife and children and children's children. Many a husband feels the breeding-sickness during his wife's pregnancy; and more than one woman has felt the pains of a husband or child when he was dying in a distant place. Divine Love, however, holds but a divided dominion anywhere among men on earth, and men's highest experiences show only its latent tendencies rather than its ripe, vivifying power. Yet it is certain that we are capable of Divine Love; that a common and mutual love causes mutuality of life among its sharers; and that by loving in God's way either persons, or principles and qualities that God loves, we actually live in them, or conjoin them to our spirit's body.

Being infinite in its nature, Divine Love can evermore spread and grow intenser wherever it is kindled. It can enable millions to live each a distinct life in what is substantially the same body, as a whole cathedral-full of persons can each lose himself in the strains of a thousand harmonious voices, and appropriate the whole concert. Analogy indicates that Divine Love, after enabling one to live divinely in a smaller body of harmonized souls, can then enable him to incarnate himself in harmonized generations and nations and worlds. Divine Love is ubiquitous, and can give even the human soul a body whose faculties grasp everything worthy of its heart; a body whose birth into new heavens never ceases, whose growth is eternal.

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Dr. Atkinson's paper was discussed by Drs. S. Waterman, N.Y.; J. J. Caldwell, Baltimore, Md.; Taft, of Cincinnati, O.; King, Pittsburgh, Pa.; R. F. Hunt, Washington; Ford, of Atlanta, Ga.; Keech, of Baltimore; Walker, of New Orleans; Atkinson, of N. Y.; Evans, of Baltimore.

DR. WATERMAN said —

I am not in the habit of speaking in public, but I cannot deny myself the pleasure of adding a few remarks to the excellence of the beautiful paper read by Brother Atkinson. The subject is of course not exhausted. The Doctor has made a very beautiful remark, which he might have extended for our benefit and for our entertainment, if he had thought proper to do so; and it is, for each one of us to build up, extend and verify the statements that have been made by him.

He spoke of saliva which changes chemically under certain passions. That is very true. How often do we find the characters of mothers changed during pregnancy. We find very tame mothers become very courageous; those that have been very shy become at once very boisterous, and husbands do not know what has become the matter with their wives. It is the reflex action produced by the change of molecules, and it is recognized upon the whole system of the individual. Who of you does not know what peculiar desires women have for particular food during pregnancy?

DR. EVANS, of Baltimore —

I think a paper of this kind requires a little thought and consideration. I am sure the Doctor did not prepare that paper hurriedly. It contains a great many truths. It requires time to select and appreciate these truths. To do its vastness justice, sir, it would require volumes. Embryology, as is wisely and beautifully said, is the foundation of all truth.

There is one point the Doctor touched on: it is our national sin. The fear of all the people throughout our country is, they cannot bear the expense of rearing progeny. Now look at it: Massachusetts is running behind her once vast population; the natives give us but thirty or forty children to the thousand. How long will it take us as a generation to lose our identity? And then where will be our independent spirit? I wish I could have, as the Doctor says, more time to give these theories thought.

DR. TAFT —

I simply wish to refer to that fact brought forth in genea-

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logical study, which is this, that in studying over the history of a certain family for two hundred years past, I find in the records of two hundred years ago that the number of children in a number of families ranged from six to thirty-two. Now by carefully looking over the records of the same families, we find the progeny to be from two to six in a family. The number is gradually diminishing, and if it goes on as it seems to be, it will simply fade out. We must not only look to the outside surrounding circumstances, but our mental condition. I have for a long time been impressed with this idea of having surrounding circumstances of the best possible character during this period. An interesting circumstance occurred recently. One, a lady who had been married for some years. Some two years ago she became pregnant, and she, owing to her great desire for children, was highly delighted when she found herself in this condition, and was perfectly happy all through. The child has come, and it is a model of health. It is never known to fret. Where the child is it is very warm, and it has been during these summer months getting its teeth, but they are coming along so nicely that you would not know anything was going on. Now for another case, that a neighbor too. During the time of gestation — and this mother did not desire to have more children than she had, and was determined not to have if she could avoid it, and did a great many things which she hoped would destroy the fœtus — she was cross to every one. When that child came it weighed but four pounds. It was small, but was properly formed in all parts. The child has been in a dying condition almost ever since its birth, now about four months. It has been in a fretful, peevish state from its birth to this time. Now these two cases impressed this upon my mind, and I have no doubt that this principle is operative in all cases; and hence the importance, as stated in the paper, of having the mother not only supplied with the proper food for herself and the child, but to have her surrounded with all the circumstances that will tend to produce the best state of mind with her. I have no doubt the milk of mothers is poisoned by mental disorders which she undergoes during the time of gestation. Let every husband look after the wife, and let her be in the best possible condition during the time of gestation; and then after the birth of the child, let the mother be scrupulously cared for; let her be in that condition in which she can best prepare the food.

DR. KING —

I have a little boy at home, and he has a habit about him that has been explained to me since I have been here. He is

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always fixing teeth. My wife was always by my chair when I was filling teeth. The paper our friend, Dr. Atkinson, has read I am entirely unqualified to criticise.

DR. HUNT —

Mr. President, I do not rise by any means to discuss this paper, because I must confess my inability to enter into any discussion of the subject taken by Dr. Atkinson. The question might be asked by many persons, and probably by a good many of our number, what has embryology to do with filling teeth? I want to allude to one passage in my address of yesterday, which will explain better than I could by speaking why and how this embryology would interest us now. [The Doctor quoted as follows from his address:]

"While our profession was in its infancy and childhood, and the knowledge and requirements of those pursuing it were limited, the responsibilities were light to a corresponding degree; but as with the rapid and enormous advances made, wide fields of knowledge were opened to us, and great floods of light were poured in upon us, our responsibilities have grown and increased, until now they stand before us in that solemn aspect which makes us the keepers of our brother, the conservators of his general physical wellbeing, and even the custodians of his life; for we have reached that point where our investigations and studies, and consequently our practice, can no longer be confined to the oral cavity, but must embrace the whole human system in all its various organisms, and weigh the influence of external relations and circumstances. Our search for causes will carry us back to former generations, and the good effects of our labors should be felt by the descendants of those who place themselves under our care."

With that view of the case we can see very easily how and what an intimate connection there is between embryology and the conditions as affected by preceding circumstances. If we want to trace these, and we must trace them, we know our only resource is to examine the question of heredity. We must take into consideration all the facts of the case that accompanied this human being from its grandparents down. Then in that view of the case there could not be a more important subject for us to examine than this one that has been laid before us to-day, that of embryology.

DR. TAFT —

In some cases the future of the child depends upon the father to some extent, as well as the mother. I have in my

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family a case of heredity where the child seems to overleap both the father and the mother and partake of the grandparents.

DR. FORD —

My experience with regard to children taking that leap is that they partake more of the grandparents than they do of the parents. I think you will find that it will go back to two or three generations.

DR. E. P. KEECH —

I know Dr. Atkinson is going to say something, and I should like to ask him a question which I would like him to answer. During pregnancy the character of the mother is changed. I would like to ask the question whether that is a permanent change; whether, if so, it may or may not be altered during the next pregnancy?

DR. WATERMAN —

I think the question is answered. It is continued with the condition of the mind of the mother during pregnancy. It affects the condition of the foetus, and with regard to the question whether it will act permanently, I have only to say that the condition of the female changes in my experience; that at one time she may be boisterous, wild and uncontrollable, whilst at another she is perfectly herself again, docile and quiet. I think it is not permanent.

DR. ATKINSON —

Beloved brethren, you know when I was on the floor before, I expressed a desire for time and endurance and patience and power to elaborate the question before us. That comes back to me with redoubled energy. The question that is asked involves an understanding of these principles to be satisfactorily replied to. We only can bring a few examples of proofs of men that are beginning to inquire in this direction. I will state that there are cases on record that have held unmistakable marks of a former generation of the same family. We cannot foretell what will be the character of a person by his parents or grandparents. Gentlemen, you see how ample our subject is. Our time is flowing fast, and we have a good many other subjects to consider.

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DR. CALDWELL mentioned a case which would seem to prove *pro tanto* the law of moral heredity. This was a case of criminal and probably violent intercourse by a bad man with a young girl. The resulting progeny, traced through several generations, showed among them one hundred and thirty criminals coming from that one bad man.

DR. EVANS, of Baltimore, said that while giving due weight to the effect of heredity on the part of the bad father, the moral character and surrounding circumstances of the girl should be considered, as they must have some influence on the offspring. There is no doubt that the peculiarities of the father are often reproduced in his children.

DR. WALKER —

Mr. President and Gentlemen :—Occupying as I have done here a focal position, I have felt coming up from various minds what has seemed to them a practical question, *i. e.*, what has all this to do with dentistry? I answer, everything. Are we scientists or are we mere mechanics? If mere mechanics, then dentistry may comprise only the art and skill of handling material elements and restoring lost tissue. If we are scientists, then our work extends very much beyond mere manipulation, and underlying our investigations are two fundamental subjects, embryology and nutrition. And before we can understand why the teeth decay, or how we can best prevent the unfortunate conditions which we are called upon to remedy, we must understand the laws that govern these two questions. And, sir, when these laws become known not only to the medical profession but to the law-makers and the people, so as to be the motive power in society, then will the very materials which are now piled up in our lunatic asylums and penitentiaries be converted into facilities for a system of education, which, founded upon these principles, will render penitentiaries and lunatic asylums unnecessary.

DR. TAFT mentioned a case which was *apropos* of this discussion, of a pure Alderney cow that was fecundated by a male of inferior breed. All her subsequent offspring, though by pure Alderney males, partook of the inferior character of the first male, showing a remarkable persistent impression made

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by the first impregnation. Also another in which he had obtained pure Italian bees by the fecundation of a half Italian queen by a pure Italian male.

On motion of Dr. Coy the subject was passed.

On motion of Dr. Hunt the papers on Anæsthesia and the Spectroscope were made the special order of the morning session of 16th inst.

On motion of Dr. Taft, the subject of Operative Dentistry was made the special order for the afternoon session of to-day, 15th inst.

The United Meeting then, at 1.30 P. M., adjourned.

Afternoon Session, Second Day.

The United Meeting reassembled at 4 o'clock P. M.

Dr. Corydon Palmer made the following remarks on the special order, Operative Dentistry:

The subject before us this afternoon is Operative Dentistry, and it is on that subject that I wish to say a few words. Let me say to you that I consider the first step to be taken in filling a tooth is the adjustment of the rubber dam. Every one should be able to do that *in every case.* I claim that I am able to do it. The dam being adjusted, the next thing is to get space. I consider direct wedging the best mode. Introduce the wedges properly and you will get the space. The next thing to be done is to prepare the tooth in such a manner that it will be suited to the best gold that can be used. Then the dam being adjusted, the space secured, and your cavity prepared, use the *most cohesive gold.*

THE SUBJECT OF CLAMPS.

Gentlemen:—The clamps we have to-day, with the spring to place over the tooth, were first designed, and also the manner of using them, by my son, Delos Palmer. Place the dam over the clamp, and then place the clamp over the tooth and slip the rubber dam out of the way. I have clamps with me which I made at his suggestion, that I have had under trial during the last winter. The set of clamps designed by

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me is one for each tooth in the mouth. The great obstacle in filling a tooth with the clamp on it is, the bow gets in the way, and you can't get at the cavity when in certain parts of the mouth. Let me say that there are, so far, clamps beautifully adapted to the upper set, and there will be for the lower.

There is that difference between the teeth which demands a special clamp for each tooth. I wish to encourage the use of cohesive gold, and I speak of the necessity of having the dam adjusted perfectly if you would use cohesive gold.

To make a clamp for a special case, take an impression of the tooth with White's impression material. Make a cast in that impression, and make a clamp of some soft material, such as air-chamber metal, and fit it to the tooth just as you would have the clamp, taking care that the bow is out of the way. Then flatten that, and lay it on a piece of sheet steel and cut a clamp by it. Bend the clamp so that when it goes on the tooth it will have sufficient spring to hold it in place. Put the spring temper in it, and you have a nice clamp. This special adaptation to difficult cases I consider to be the most valuable thing in the use of clamps.

In using rubber dam I have a punch, from White's, that shuts together like a pair of pincers and cuts a very nice hole.

DR. HODGKINS —

I would like to ask Dr. Palmer if he prefers any particular kind of dam?

DR. PALMER —

I have never had such a trial in all my experience with the teeth as last winter, when I had to take just such material as the agents brought me. I think it is cruel to put thick rubber on the teeth. It draws upon the teeth so hard that it becomes painful.

DR. FAWCETT —

Do you use cohesive gold in all cases?

DR. PALMER —

In everything. Now, a few little hints about the manner of introducing the gold in the teeth, and of handling the instruments, &c. If you should endeavor to fill a tooth by carrying the gold only in one direction, it will not be a perfect filling. Carry it towards the wall. If you carry cohesive gold towards

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the wall, you will make a tighter filling than with any other gold. The difference between the use and manipulation of soft and cohesive foil is this, that the soft foil is capable of being placed about in the cavity until you are satisfied with it, and with the cohesive foil you must place it where you want it. Cut it in small pieces and place it where you want it before you attempt to strike it. You can reach every point. I am particular to speak of this part of my subject, because there is a prejudice against the use of cohesive foil, and I am sorry to say that some of our most reputable operators have a tendency to fall back upon the old mode.

Dr. Palmer then illustrated, by the use of diagrams, his mode of preparing the cavities and inserting the gold, stating that he used No. 4 cohesive.

At the conclusion of Dr. Palmer's remarks, Dr. Waters, of the Executive Committees, stated that there would be clinics to-morrow morning at half-past eight by Drs. Atkinson, Ford and E. P. Keech.

On motion of Dr. Walker, the United Meeting took a recess until 7.30 o'clock.

At the expiration of the recess the United Meeting reassembled, and Dr. Walker read a paper, prepared for the S. D. A., by Dr. A. F. McLain, of the New Orleans Dental College, on—

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THERAPEUTICAL TREATMENT OF DENTINAL PULPS.

Of the various pathological conditions which may arise in the teeth, none are more difficult to combat successfully, and which require a more intimate knowledge of the power of therapeutical agents, than those having their origin in the dentinal pulp. These organs are subject to irritation from various causes, growing out of certain circumstances, as accidents, thermometrical changes in temperature, and from that most common cause, decay of the teeth.

The effect of irritation to the pulp, if not met therapeutically at its earlier stage, ultimately leads to the congestion and inflammation of that organ, thereby producing its death; and by the continuance of these pathological states, disease is finally communicated to the peridental membrane. Now, the irritation, congestion, and inflammation of pulps, caused by mechanical shocks, fractures, abrasion of the dentinal fibres, changes in temperature, or from the rapid progress of decay permitting chemical action on the pulp, are to be treated by different medicinal means suitable to the case. Congestion or inflammation having its origin from shocks, fractures, or abrasion, is not, according to your lecturer's experience, amenable to conservative treatment. In such cases no alternative remaining, the course to be pursued is to proceed to devitalize and extirpate the pulp, the operation to be concluded in the usual manner of root and crown filling. The chances, however, for preserving pulps alive in such cases are insignificant, and is successful only when the irritation is of a slight character, and when its origin has been due to gradual exposure, during the progress of which the vital forces, by throwing out plastic lymph, shield the pulp in a measure from the effects of external agents. When, on the contrary, the solution of the tooth substance is rapid, the pulp becoming suddenly exposed, the amount of irritation which follows soon brings about that hyperæmic condition known as congestion, whereby more blood is thrown into the pulp-cavity than is natural, and that surplus blood not finding an exit into the general circulation, produces so much pressure as to strangulate and cause the pulp to die. The consequences of this last do not stop here, for if not relieved at this stage, decomposition and liquefaction of the pulp tissues ensue, causing a development of gases, which, together with the decomposed matters, force themselves through the apical foramen, and there coming in contact with the pericemental or

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peridental membrane, set up anew the phenomena of congestive inflammation, and thus pave the way to the usual concomitants of that pathological condition, *alveolar abscesses*, *necrosis*, etc. The sudden application of cold to the teeth acts in the same manner and with like results. This frequently occurs from the contact of ice-cold water, the effect of which first drives the blood inward, in short inducing an intropulsive movement of the hæmal current, but which is soon followed by a reflex action, which fills to repletion the *neuro-hæmal* sheath, thereby establishing a perfect stasis, with the usual phenomena and consequences of congestion.

A slight congestion of the pulp is sometimes removed by a gentle puncture through a carious opening in order to evacuate the excess of blood; and should this fail, tepid water taken into the mouth, or a stimulating wash, may succeed in bringing about the desired end. Warmth, it is well known, acts beneficially in congestion by giving force to the arterial current, and in that way sweeps the stagnant venous fluid into the general circulation. Resort may be had also to local bloodletting from the vicinity of the affected tooth, which acts very happily at times. A blister on the gum may be tried with propriety; but if immediate relief does not follow these several modes of medication, the vitality of the pulp is pretty sure to succumb, even though the hyperæmic condition had not lasted more than an hour or two. In speaking of local bleeding, preference should be given to leeching, as by that process the unloading of vessels in the immediate vicinity of those connected with the affected pulp is accomplished without leaving much irritation behind.

When an inflammatory process exists but in a moderate degree and of a small extent, that is, merely the exposed portion of the pulp, the prognosis as regards the preservation of its vitality is more favorable, as the effusion into the pulp cavity is small in quantity, and the character of the exuded fluids being endowed with powers of organization, the vital forces are often able to limit the evil effects of inflammation; and even should this effort fail, the pulp organ may still be within therapeutical means. To gain so desirable an object, sedative applications should be made directly to the pulp and the surrounding parts, with the view of lessening the arterial supply, and to allow nature to resume her sway. For this purpose the strong preparation of aconite, combined with other agents, will be found in many instances quite efficacious. An irritably inflamed exposed pulp will frequently be relieved on applying a mixture consisting of equal parts of Fleming's tinct. of aconite and chloroform, with one-half their proportions of the aqueous solution (*Lugal's weaker preparation*) of iodine, to which may be added a few drops of creasote or

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carbolic acid. It is an error to flood a pulp with creasote or carbolic acid, as is commonly practised. Although both of these substances possess anodyne properties, yet in an undiluted state they are escharotic and will prove irritants, and thus aggravate the symptoms. This application or dressing being made, the gums may be painted with the tinctures of aconite and iodine; a counter-irritant as well as a resolvent action is thereby obtained. Now, if the pulp is inclined to bleed, this should be encouraged by holding tepid water in the mouth or by syringing the cavity with it; and when the hemorrhage has ceased, the preceding anodyne dressing may be applied, and the cavity sealed with a solution of gum sandarac or mastic varnish on a pledget of cotton-lint. Sometimes it happens that the pain continues, particularly if it proceeds from acidity; then an alkaline dressing, such as liquor potassa or soda, with the essence of peppermint or tincture of camphor, may afford relief. A solution of chloral hydrate, made by triturating with it equal parts of gum camphor, to which may be added tincts. belladonna and aconite, or carvacrol, sometimes answers a good purpose in these cases. In fact, nearly all the essential oils will often relieve tooth-ache arising from irritated or inflamed pulps. If by any of the measures indicated, the partial inflammation of a pulp has been subdued, something yet remains to be done in order to preserve the vitality of a pulp. And the benefit, nay, the absolute necessity which exists for the conservation of the entire vitality of a tooth as regards its proper nutrition and natural appearance, to say nothing of the gradual deterioration which inevitably befalls a crown when the *neuro-hæmal* connection of a tooth has been diseased, removed, or destroyed, is too well understood by you, Mr. President and gentlemen, to need an elucidation here. Neither is it necessary to enter into a disquisition in regard to the peridental trouble, alveolar abscesses, &c., which so often supervene upon the ulceration and putrefaction of a pulp when such a course has been allowed to take place.

To digress a little, many writers and speakers on this subject assert most emphatically that pulps in almost every stage of disease, from partial inflammation and ulceration up to actual gangrene, if limited, can be saved alive by a certain treatment. Now this is contrary to the experience of the author of this paper. For he has found that with the utmost care in the management, and in spite of the most thorough therapeutical treatment, a pulp that once has been the subject of inflammation or in any way ulcerated, invariably dies, causing more or less subsequent disturbance.

As has already been intimated, the conservative treatment of a pulp is only half accomplished on arresting the irritation

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consequent upon exposure. It is essentially necessary to shield it from the contact of air, moisture and all extraneous exciting matters, else a recurrence of the same conditions would take place, and thus render subsequent efforts at preservation unavailing.

It is now pretty well admitted that pulps, if properly covered, and under favorable circumstances and in well constituted organs, especially in those cases where irritability is slight, or when the pulp has become exposed from the mechanical removal of caries, ninety-five percentum can be saved with all their vitality. To do this, some non-conducting material, and, at the same time, perfectly congenial, must be interposed between the exposed or sensitive pulp and the filling, and so adapted as to prevent pressure upon the pulp, as well as leave no space for the retention of air, or any exudation fluid that might escape from the pulp cavity. To these very causes may be attributed the common failures which formerly attended the *capping* of pulps when solid substances, such as gold caps, horn, lead, asbestos, &c., were employed for that purpose. A vacuum was thus left, which permitted plastic lymph, blood, or atmospheric air to accumulate or remain in contact with the pulp, and by that means caused continued irritation, which finally brought about its dissolution. Flooding the cavity with creasote or carbolic acid, and then coating the surface with oxychloride of zinc, often fails of its purpose, because the caustic effect of the chloride of zinc therein contained, is apt to irritate and cause the devitalization of the pulp, notwithstanding the thin film of coagulated albumen and fibrine that may have formed through the action of the creasote or carbolic acid upon the exuded plasma for which an affinity exists.

Now, this protecting layer may be more readily and effectually formed artificially by applying collodion to the exposed surface, but still more certainly by painting it over with a solution of Hill's stopping, which is obtained by dissolving the stopping in chloroform, forming a thin paste. In applying it, the cavity is to be well dried, and kept so; but previous to which, it should be bathed with the anodyne mixture previously mentioned; then, with a pointed stick or fine excavator armed with cotton lint, spread the solution of Hill's stopping over the exposed pulp or sensitive dentine, taking care to remove any surplus that might appear on the parietes of the cavity. It may be necessary, according to the size of the cavity and thinness of the solution, to coat over the surface several times in order to prevent the chloride from penetrating to the pulp. It will be found on trial that, in ninety-nine cases of exposed pulps in the hundred treated in this way, not the slightest pain will be experienced on introducing the oxy-

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chloride of zinc. After this, sufficient time being given for the evaporation of the chloroform and for the film to attain some degree of firmness, a crust of oxychloride of zinc is spread over the surface to receive a permanent filling, or the cavity filled up entirely with the oxychloride as a temporary filling, as circumstances might require.

Perfect dryness of surface being an essential prerequisite for the successful application and cohesion of the solution of Hill's stopping, the rubber dam becomes an all-important aid in the process. Furthermore, the permanency of the film thus formed, as well as its non-conducting powers, are greatly enhanced by adding to the solution a small quantity of pulverized silex.

Not unfrequently, in cases of very slight pulp exposure, particularly if no previous irritation or inflammation had existed, the oxychloride covering may be dispensed with entirely, and a permanent filling inserted at once, after the simple covering of Hill's stopping has been made. On the other hand, where the double capping with the two substances is necessary in consequence of greater exposure, but otherwise under equally favorable conditions, very little risk will attend the conclusion of a permanent operation. In the event, however, of previous irritation having been manifested in pain or any other symptoms, prudence would naturally dictate the propriety of merely inserting a temporary filling after the cappings, with the view of waiting for future results, to see, in short, whether the vitality of the pulp has survived, or had in the meantime succumbed to morbid impressions.

Now, having treated at some length the mechanical means as well as detailed the remedial measures by which irritable and exposed pulps may be protected and medicated so as to preserve their vitality, it will not be inappropriate in the same connection to say something in reference to the therapeutical management of those pathological conditions which result from devitalized pulps.

They comprise *Alveolar Abscess*, *Pericementitis*, or otherwise *Peridentitis*, *Exodontosis*, and *Necrosis*. To appreciate fully the nature of such departures from health in the dental organs, it may be well for us to examine into their pathological causes, in order to be able to apply rational modes of treatment.

In the first place, any irritant, whether vital, chemical or mechanical, when applied to sentient parts, produces a disturbance in the circulation of that part. On its first application a rush of blood takes place — in another word, a determination — the artery dilates, becomes distended, but which subsides immediately if the irritant be withdrawn. On the other hand, the irritation being continued, the veins at and near this point soon manifest a tendency to become obstructed,

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the motion of the blood begins to flag, and if not removed, the circulation in the part ceases entirely. These being the usual phenomena presented in congestive hyperæmia as regards other organs, it can be readily apprehended that a precisely similar course follows in the vessels of a pulp; for in this state of hyperæmia, the artery being free to act, from the *vis a tergo* force of the heart, continues to pump more blood through its channels into the pulp cavity, and the mechanical impediment offered to its flow into the venous opening fills to repletion the whole bony canal of the tooth, and thus produces so strong a pressure upon the vessels and pulp substance as to lead to the strangulation and ultimately to the death of this organ. Now, when that other and more complicated form of hyperæmia, inflammation, occurs, though located in the arteries and arising from the same cause, over-stimulation, still the same result eventually follows which is due to over-distension, venous obstruction, stagnation, &c. Here then are two distinct processes, one *passive*, the other *active* hyperæmia, presenting different phenomena and with somewhat different results, when occurring in the soft textures, yet in the dental organs their pathological sequences are almost identical. The reason is obvious. In a healthy or physiological state, the artery and vein entering the tooth through a constringed apical foramen, and all being enclosed in a common sheath with the nerve, they gradually expand at the bulbous portion of the pulp, and the blood of the artery, after having deposited its plastic nourishment in the different portions of the crown of a tooth, is returned freighted with the waste or worn-out materials into the vein, in order to be conveyed back to the heart and lungs for subsequent aëration and revivification.

Either of these two processes, *passive* or *active* hyperæmia, occurring in other portions of the system endowed with expansive powers, the excess of blood finds a vent through the enlarged porous openings, made so by the overstretched fibrous network of which the channel-walls of the vessels are formed, thus affords them a partial relief, by the exudation of the serous portions of the blood into the surrounding tissues. Therefore, it may be readily perceived that an exposed pulp, being enclosed in a dense, unyielding, bony channel, an irritation occurring from any cause naturally induces an afflux of blood to the pulp, which so chokes or blocks up the avenues leading into the vein, as to fully establish all the phenomena of obstruction, stagnation, pressure, &c., characteristic of the congestive state, and which finally ends in the destruction of the *neuro*-hæmal structures.

Viewed pathologically, the distinctive differences existing between these two processes, *congestion* and inflammation, are sufficiently well marked as regards their respective symptoms

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and results when occurring in the soft tissues, as to be clearly appreciated. Preceded as they both are by determination, yet they have different locations, congestion being situated in the capillaries and veins, whilst the other is situated in the arteries. But one or the other may occur according to the strength of the irritant or the length of its duration. This has been demonstrated repeatedly under the microscope by applying to the web of a frog's foot a solution of capsicum; immediately blood was seen rushing toward the irritated point. Here was the determinative stage. On continuing the stimulation, though the arterial current had not ceased, yet its motion became somewhat retarded, the capillary tubes were observed to become more and more distended and of a darker red appearance, the blood corpuscles lost their disc-like form and were seen as elongated spheres worming themselves along, which imparted an oscillatory or vibratory motion to the local excess of sanguineous fluids. This was incipient inflammation. But, by increasing the strength of the irritant, or by prolonging its action still further, the veins were seen to be completely obstructed, the motion of the blood in the capillaries became arrested, and the part assumed a blue color. Here, then, were presented the usual phenomena attendant upon a fully established congestion. Now, what is the usual result of such hyperæmic effusions? The delicate membranes forming the channel-walls of those small hair vessels, from overdistension they naturally stretch, their fibres separate, and the serous fluids of the blood ooze through into the adjacent tissues. These fluids being strained as it were, of most of their organizable properties, and losing still further their vitality by their long retention in the parts, they naturally decompose, and in so doing, the textures thus encroached upon undergo atrophic softening, which favors the formation of abscesses.

The products of congestion being, as we have shown, *aplastic*, that is, devoid of the powers of organization by reason of their source, and from the degenerating process to which they had been subjected, would clearly account for the non-production of growths or hypertrophies as resulting from this state. And on the other hand, it is perfectly apparent why a moderate inflammation is more liable to become organized than the other; the effusion it furnishes, coming as it does immediately from the arterial system, is freighted with more plastic properties, hence has a tendency to organize. But an inflammatory turgescence may be so strong as to cause so great an afflux of blood to the part, that the exudation may be excessive, then the results may be the same as those yielded by congestion.

Viewed on general principles, the phenomenal character-

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istics and sequences of the several hyperæmias just considered, are ever the same in whatever portion of the system they may occur, excepting, perhaps, in the dental organs, where they are somewhat modified and combined, owing no doubt to their greater density and want of elasticity and absorptive powers, thus giving these processes a compound character, which may be aptly termed *congestive-inflammation*. Consequently, whenever an irritation of sufficient magnitude occurs in a tooth, the hyperæmia excited commonly assumes a congestive type, and generally ends in the decomposition and liquefaction of the pulp tissues. The products thus yielded, pus and gas, find their way through the apical foramen, and there, coming in contact with the peridental membrane, renew the congestion or inflammation, which, if not subdued, eventually terminates in *alveolar abscesses* or in *necrosis*.

When the inflammatory congestion of a pulp is of a subacute nature, the foraminal infiltration is apt to be slight, hence the morbid process becomes limited to the end of the root, where a portion of peridental membrane detaches itself, and assumes a pouch-like form, which serves as a barrier to the extension of the irritation. Frequently the *vis conservatrix*, in thus limiting the morbid process by the formation of a receptacle for those acrid matters, gives vent to them by means of a fistulous opening in the vicinity of the root affected. Relief is thus afforded for a time, but sooner or later the peridental membrane loses its vitality, and then necrosis of the root or roots necessarily supervenes; and if these be not removed, the alveolar processes may become similarly involved.

It often happens that an inflammatory action in a pulp consequent upon its exposure, is of so mild a nature as to produce only a moderate degree of exudation, and from being rich in plastic lymph, a deposition of secondary dentine takes place in the pulp-chamber, or on the roots, thus occasioning *exodontosis*.

In treating the consequences of dead pulps, the therapeutical indications are obviously to remove them when it is possible, before their decomposition has commenced. If in the inflammatory stage, it should be subdued by the introduction of anodynes and sedatives. These consist of aconite, chloroform, creasote, or carbolic acid, morphine, &c., &c. When the inflammation has reached the peridental membrane, an application to the gum of equal parts of the tinctures of aconite and iodine will frequently suffice to remove the difficulty. Should this fail, resort may be had to blistering about the region of the tooth; which is done by means of cantharidal collodion, or with strong ammonia; but when the hyperæmia has assumed the congestive form, then leeching the gums may be efficacious. This mode of abstracting blood should not be

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adopted, however, at the inception of the inflammatory stage, as an encouragement to the afflux of blood to the part, already too great, would be given, and thus aggravate the symptoms. The existence for some hours consecutively of such a state, the practitioner may conclude with certainty that the inflammation has passed into congestion.

Warmth and stimulants, within proper bounds be it understood, are most valuable therapeutical agents in the treatment of congestions. They act by expanding the arterial trunks, thus giving an impetus which sweeps back into the circulation the stagnant blood which had been arrested in the veins and capillaries. On the other hand, cold applications, frequently renewed, are of great benefit, as by their constringing effect on the vessels a determination of blood is moderated, thus allowing the circulation in the part to regain its equilibrium, by which means a resolution of an incipient inflammation is promoted. Heat and cold are merely relative terms; they are both sedative and stimulant, but inversely. To gain a sedative effect from cold, the application of it must be persistently continuous, which is obtained by frequent repetition, else the blood that has been repelled at first by the contraction of the vessels surges back, hence, instead of acting as a sedative it becomes a stimulant, which increases the local hyperaemia. It is, therefore, very evident that cold can be made either stimulating through its intensity and transitory application, or sedative by a persistent, non-intermitting course in its use.

Should the inflammatory congestion show signs of resolving itself into an abscess, the abstraction of blood becomes an immediate necessity. Leeching is preferable to scarification, as the lancet does not deplete sufficiently, besides increasing the irritation through the wound it makes. On the formation of an abscess, however, a free incision should be made into it, in order to relieve the distension and consequent pressure caused by the exudation that has taken place in the parts. At the same time, the pulp chamber and root canals require to be thoroughly cleared of all decomposed or decomposable matters, such as the pulp-blood, pus, or any other foreign irritating substances that may be found therein; after which, the cavity ought to be well syringed out with tepid water, and a dressing of chloroform, aconite, iodine (*aqueous solution*) and carbolic acid or creasote, introduced on a lock of cotton loosely placed in the pulp cavity. This is particularly essential if pain exists, as by sealing the cavity the secretions and gases that might form in the tooth would find no escape, and in that way increase the pressure and consequently also the pain. Otherwise, a covering may be placed over the application, in order to prevent the remedies from being too much diluted or

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washed out. These dressings are to be renewed at first from day to day, then every other day, and finally once or twice a week until the abnormal symptoms have disappeared. An obstinate abscess may require from ten days to several months to be effectually subdued. A sinous opening existing in the gum near the root of an affected tooth, the preparatory treatment need not be continued more than a few days, long enough to cleanse the pulp chamber and root canals of all extraneous matters and otherwise disinfect them; but a permanent filling may be introduced with little risk, as the vent thus afforded for the escape of the pus or gas that might be generated would prevent the natural consequences usually resulting from pent-up fluids. The remedies introduced into a tooth with an abscess may be a little more concentrated than those applied to exposed pulps or sensitive dentine; but it is well to reiterate here that the use of pure creasote or carbolic acid in a tooth in any case should be deprecated, particularly forcing it through the apical foramen, as too many do in treating teeth. The escharotic nature of these agents can not act otherwise than excoriate the already diseased peridental membrane. Sometimes the introduction of carvacrol in connection with the previously named anodynes into an abscessed tooth will cause the secretion of pus to cease in a few days. Occasionally much good may be derived from varying the remedies, by substituting tincture of belladonna, essence of peppermint, or tincture of camphor in lieu of carbolic acid and creasote. Again, camphor-chloral in the place of those articles just enumerated, but in a diluted state be it understood.

When the discharge is persistent, failing to respond to the preceding modes of medication, diluted aromatic sulphuric acid, introduced on a probe armed with cotton lint through the tooth, acts very efficiently at times. The same agent may be tried at the apex of a root, by means of a perforation made through the gum and process. The great dependence placed by some operators on this method of curing alveolar abscesses, your essayist is free to confess has not availed him to that extent which its advocates claim for it. Chloride of zinc can be used in the same way, and by injection through the pulp cavity for indolent abscesses, with the view of breaking up the pyogenic membrane which lines the sac of the abscess, and also as a stimulant for the promotion of a healthy action. Nitrate of silver might perhaps be used with equal advantage for such purposes, were it not for the objectionable and inevitable coloration of the tooth it produces when so employed. Surgeons, it is well known, are in the habit of curing most intractable caries of the bones with this agent. At all events, nitrate of silver, as well as sulphuric acid and chloride of zinc,

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may be used in the treatment of alveolar abscesses without incurring the risk of coloring a tooth, by introducing it to the apex of a root through an artificial or a fistulous opening.

An abscess which does not respond readily to the appropriate treatment is sometimes thoroughly healed by placing in the cavity a dressing well medicated with anodynes and antiseptics, and afterwards inserting a temporary filling, which may be left in for several weeks, and even for months, for the purpose of allowing the recuperative forces to have full play. If, after a length of time, no odor or any secretion appears on opening the cavity, a permanent filling may be made with little danger of subsequent bad results.

The remedial measures to be employed in a fully established Exodontosis are *nil* as far as the author's experience goes. Prevention, if possible, would seem to be the only rational course to be pursued; and as this pathological condition often arises from a sub-acute form of peridental inflammation, or sometimes from a rheumatic predisposition to peridental irritation which excites hypertrophic action, hence the adoption of prompt antiphlogistic measures, such as leeching, blistering, and discutients, early in its symptoms, the disease might perhaps be prevented or cured. Rheumatic subjects being those most liable to this form of hypertrophy, a natural inference may be drawn, that when this affection is suspected, particularly in one having a constitutional tendency to rheumatism, the treatment proper for this last would also be good for Exodontosis.

For Necrosis of the roots of teeth, they having become foreign bodies through loss of vitality, their removal becomes a prime necessity.

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Dr. Coy, Chairman of the Committee of the Maryland and District of Columbia Association, then read the following paper on Operative Dentistry:—

COMMITTEE'S REPORT ON OPERATIVE DENTISTRY.

The committee assigned the subject of Operative Dentistry, owing to the want of organization in this section of our Association, offer the following reflections, suggestions and conclusions for your consideration. We have thought proper to run casually over the general field of operative dentistry, rather than to enter into close and pointed discussion on any of the many subjects embraced in this department. We are influenced to this course when we consider that the members of this association, to an unusual extent, are men of experience and ability, and too of fixed principles of practice. Therefore we approach our subject with becoming modesty and caution, knowing to whom we speak. After speaking of filling and the restoration of the lost parts of teeth, whether by decay, abrasion, natural wear or accident, we will refer briefly to the diseased or abnormal conditions of the oral cavity, which influence to so great an extent all operations made or undertaken in this cavity, through its complex and delicate network of nervous distribution. With all their direct and reflex irritations, the dental surgeon of to-day finds himself compelled to study closely, not only the near surrounding, but remote parts in more or less sympathy with the nerves of the mouth, face and head.

When politely invited to furnish a paper upon the subject of Operative Dentistry by our worthy President, we were at first thought inclined to think that the subject of soft and cohesive golds (these terms will be used for convenience sake) had been hammered out too thin already, either with the mallet, our pens or our professional tongues; and yet we feel there is still room for a few more blows. While we are advocates for both of the golds referred to, we think the intelligent, conservative operator will know when the one or the other is demanded; but unfortunately for our patients and our profession, there is too large a class in our ranks, not only the young beginner, but even those who have spent twenty-five or thirty years in practice, who are disposed to ride hobbies, filling not only the air, but our journals, with the cry of "Eureka."

No one will be found to advocate the restoration of teeth by contour operations with anything short of cohesive gold,

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and we imagine that but few of our best operators would deem it wise or *necessary* to fill a simple cavity with cohesive gold. Our distinguished and brilliant operators of twenty-five or thirty years ago, whose operations are standing to-day as monuments of their skill and ability to manipulate soft gold, filled such cavities with cylinders and ribbon — of course no attempt at contour restoration. Doubtless many of us have seen operations in what we term simple fillings, when the tooth has been overstrained by the process of wedging cylinders against the thin walls of cavities, owing to either miscalculation as to their strength, the frailty of the enamel, or not sufficient attention to the force applied. This is a rock that has wrecked many a ship, many a dentist's reputation, and ruined thousands of teeth under both kinds of gold. This overstrain on the glassy enamel is not apparent at the time perhaps to our limited vision, but that dark shading, afterwards noticeable about the filling, more frequently gets there through the enamel than at the borders of the filling. Admitting that the enamel, as hard as it is, can absorb a certain moisture from the fluids of the mouth, how readily the slightest check or minutest fissure can take up the more destructive elements of the saliva. You find your movement is flanked by either of these openings, and you must retrace, repent and learn.

A strong magnifier is of great assistance in marked cases of overfilling, but we may feel in using one as the merchant does when he feels he is in a bad way — a dislike to looking at his balance sheet. Our only remedy is either to cut away the checked enamel, or resort to some preparation of oxychloride zinc. Many operations in approximal especially distal cavities, even those to end in contour filling when difficult of approach, may be one-third or one-half filled with cylinders; we mean cylinders made by the dentist as he wants them, the size and amount of gold foil in each to be regulated to suit the requirements of the case before him. If the cavity is properly formed, three as large closely-rolled cylinders as can be packed covering the cervical walls, well protecting the outer and inner cervical corners, easily made solid with direct hand pressure or with mallet, using slightly or shallow serrated instruments. By this method time is saved, and to those who use serrated points the danger is obviated of crumbling the cervical wall and the outer and inner angles — a dangerous coast to navigate in many approximal cavities. As to fillings in the grinding surface of molar teeth, we will leave gentlemen to make their own election. If time is of any consequence to an operator, we would say use cylinders as far as good judgment will warrant. If time is of value to an operator, his patient must pay for that time; therefore it is our plain duty

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to put our patients to the least possible expense, and give them our best skill at the same time. If you can give your patient in a half-hour as good an operation as Dr. Jones makes in two hours, you have no right to charge for a two hours' operation. Jones may be eliminating a pet hobby of some theorist, and has no right to waste his nor his patient's time in learning his lesson — perhaps in the end a failure. Let us not cut loose from the past altogether, but hold to that of the past that has proven itself valuable and sound. All that is new is no more all good and reliable, no more than all is to be venerated because it belonged to the past. We need more conservative thinking, and by a "large majority" less gushing over new and untried theories.

In the use of cohesive gold in the near past we have but little to be proud of, little of self-congratulation; the failures have far outnumbered the successes. To be sure, operations have been attempted that those of a quarter of a century ago passed by as beyond the dentist's skill to cope with.

Numerous shapes have been given to instruments, and many operators have attained good success with their own inventions. Also a large number and varied form of points have been in their turn urged upon the profession: the deeply serrated, the shallow serrations, the simple broken end of steel, the smooth flat surface, the wedge-shaped point, assisted with its numerous but slight blows, and lastly, perhaps, the round, smooth or egg-shaped point or face. The serrated points of five or eight years back have not only led us astray by their tendency to ball and draw from the very walls we designed to protect, but have done their full share in flouring and destroying friable enamel. The small wedge point has done some good service in the hands of the patient few. Those who advocate the use of the small round or egg-shape points claim several virtues for them over the serrated, without discarding the latter altogether. Many who have tried these smooth points have laid them aside, we think for insufficient reasons. We are of the opinion that the welding done is most readily done with smooth points, on a smooth surface with low numbers of gold foil, cohesive of course, but as high as 30, rolled, can be used with advantage for a final finish. In the use of these points it is claimed that a spreading of the gold takes place, and all danger of pricking or marring the most delicate enamel removed.

The use of the higher numbers of gold, except as mentioned above, your Committee are not disposed to recommend at this time, it requiring too heavy malleting. We admit that solid fillings have been made with serrated points, but contend that they are not generally so, and do not take the finish of a round smooth point, and that the gold is rather *knitted* together than

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welded. Absolute dryness is an essential in working all cohesive gold with whatever points used. Our indorsement of these points is the result of three years' experience in their use, and the liking for them has grown with a gradual growth, till previously formed ideas, notions and practice have been compelled to give way to what seems to us a more rational theory and practice. Claiming as all essential to a good filling a thorough adaptation of the gold to the walls of the cavity — relying upon the malleability of gold to force it not only into very slight, but quite marked irregularities of the cavity — it is not the hardest filling that best protects the tooth from further decay, but the one that best adapts itself to the walls. We have our plastic fillings, with which we are all familiar and for what purposes they are used — temporary fillings. We have that bulldozed and much-abused material called amalgam, or alloy, from which we make it. With all its misuse and abuse, a good alloy can be, in the hands of a No. 1 operator, made into a good filling for certain cases, and of immense benefit to our patient. In some mouths we find it next to impossible to get to the third or even the second molar, and a patient also with a purse too light to justify an expensive operation. Shall we shirk the responsibility and let our patient suffer and lose the teeth because we forsooth happen to be opposed to the use of amalgam? Its plastic condition enables us to introduce it with comparative ease, and the best alloys in the market are susceptible of a very high finish and *will not tarnish or shrink.* Gold is our friend if we but treat it kindly; nevertheless there are conditions when it cannot be introduced to make a durable filling.

In conclusion of this part of the subject, it can be said without fear of contradiction, that that filling is the best for our patients that best fills the cavity and will resist the action of the mouth's secretion, as well as the natural wear, abuse and neglect of these organs.

The abuse of which the teeth are the victims may be from the want of proper care of the mouth — a duty that should be enforced upon our patients in the most concise and unmistakable language, as our best efforts are futile unless the most thorough cleanliness is observed on the part of our patients. When necessary, exact instructions should be given as to the proper care of the teeth. And, again, it may arise from a diseased condition of the soft parts of the mouth, over which the patient can exercise little control. How often we find the exudation of noxious pus or serum about the necks of teeth, taking hold at every point of contact in the teeth, and adhering closely about our operations, ensuring their failure if the teeth remain in their sockets long enough for decay to do its work. This condition existing after operations by a

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dentist would demonstrate his incompetency or his dishonesty. The operation of properly removing the lime deposits from the necks and fangs of the teeth, even to the fang's apex, is an operation too often shirked by the dentist, but, we contend, the first one to be performed; also removing thoroughly all necrosed bone from the alveoli. Teeth so much diseased and discharging pus into the cavity of the mouth, must be either cured or removed. In the above remarks we have said nothing of the serious constitutional effects of this constantly taking into the alimentary canal this vicious discharge, either with the food or during sleep. If allowed to continue any length of time the digestive organs cease to do their duty, the blood becomes vitiated, and the whole organism becomes enfeebled, with its attendant gradual wasting away and loss of vital power.

We find another troublesome condition of the mouth in adults in fixed irregularities, where it is next to impossible to keep the gums and sockets in a healthy state, without mentioning the amount of labor and uncertainty it imposes upon us in the operation of filling.

In childhood this condition of affairs can be foreseen and remedied, either by the proper spreading the arch or arches, or removing at the proper age such teeth as can be well spared for the general good. The experience of many of our profession long in practice has led them to advocate the removal, in a large majority of cases, of the six year molar at eleven years of age, allowing the twelve year molar to erupt in its place, not only securing the full development of the third in the place of the second or twelfth year molar, but at the same time obviating the crowding of the teeth in front, the bicuspids not having as yet occluded and easily forced back by the approaching cuspid. One strong reason claimed for the removal of the six year old molar, is that it is deeply and many fissured, with thin enamel, and difficult in many cases of retaining in the mouth only long enough to leave a permanent space when its loss is inevitable. Then it has done its mischief, and had a short but expensive existence. Further, it is claimed that by this mode of treatment we save our patients the affliction and expense of the different appliances for forcing teeth into their places, often to the serious injury of individual teeth, even when success attends this physical and mental wear and tear on our part, not to mention the tortures of our little patients, whose memory reverts to these trying times when many long years have passed away. It seems difficult to see why any great diversity of opinion should exist on this subject among operators of experience, who carefully observe their patients who grow up in their care, and whose children likewise come into their hands.

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People, not dentists, will think, and observe too, and when a father or mother, or both, have lost four six year molars each, and each are in the possession of twenty-eight good, regular, clean teeth, which fill each jaw, they are likely to say that is good enough for us, take our children and do for them as you deem for the best. If this fails to send a thrill of satisfaction through our old nerves, our aspirations and humanity have nearly dried up.

It is deemed a matter of very serious consideration which of two courses we adopt in these cases. It is said, and by some believed, that physicians hide their mistakes under the earth's sod. Our mistakes, in this operation especially, visit us like Banquo's ghost at every feast, and sit peering at us from every downy pillow. 'Tis no trifling matter to take out a tooth when it should remain, neither to leave it in when it should be removed. The whole life, comfort and welfare of our patient may depend upon our decision. The subject, gentlemen, deserves our candid consideration.

At the age when these large molars should be removed, if removed at all, is one wherein we can save our little patients the severe pain of the operation by the use of anæsthetics, and for this purpose nitrous oxide is unquestionably the agent that commends itself to us. Transient in its effects, and attended with the smallest amount of danger from the age of eight or nine to thirteen, very little objection can reasonably be urged against its use; while chloroform and ether are to be used in prolonged surgical operations in the mouth and contiguous parts. In the use of these agents, caution preceded by a searching diagnosis is always demanded of the dental surgeon as well as the general surgeon. All more or less non-respirable, would suggest the impropriety of crowding the lungs with such an element, but rather a cautious approach, allowing the agent combined with atmospheric air to be first inhaled, and in a certain sense become somewhat habituated to its use before any attempt is made to force an insensible condition.

If the lungs are paralysed by the forced introduction of a non-respirable and powerful anæsthetic, the death of your patient may be the deplorable result. If pure anæsthetics are used, our patient young with no organic lesions, and proper caution is observed, little chance will remain for serious trouble. Age brings with it its ills, and perhaps by irregular habits aggravated to a dangerous point what in early life would have been of no consideration. And having given an anæsthetic safely once to a patient, and particularly a female, should not induce us to relax our caution on any future occasion. The indiscriminate use of anæsthetics by operators of limited experience, careless of their diagnosis, and with the assurance from them that they meet with no difficulty in the

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administration of any of these agents, only proves that there is a "Divinity that shapes our ends, rough-hew them as we will," and that the foolish are permitted to rush in where angels dare not tread. A thousand successful administrations will give us little assurance that we may not have a corpse in our chair before the next day's sun goes down. The importance of this subject to the dental surgeon has seemed to justify these extended remarks.

In concluding these suggestions regarding many of the operations to which the dental surgeon is almost daily called upon to give his best skill and experience, we feel that a few words may not be out of place in reference to what we term our modern appliances to aid us in our varied and delicate operations. Only a few short years since if we were to undertake the operation of cleaning out and properly shaping a cavity for filling, we scraped and scraped and cut until our poor patients really thought it was a scrape and a wretched one at that. Now, in the hands of the cautious and skilful, how quickly all is done by the use of the dental engine, with all its present imperfections. How quickly that filling in the grinding surface of a molar is reduced to a beautiful finish. How readily the roughness or green deposits are made to vanish from the incisors. All these operations before the introduction of the engine occupied hours instead of minutes. With all this comes again the same warning, "Be cautious." Much injury has been done upon soft, friable teeth by the careless use of this rapid worker. A loose band, a rested hand and a watchful eye will save us much of chagrin. With motors we have not as yet sufficient familiarity to discuss their merits or demerits. The human motor we fully recognize and endorse; we have used it. The rubber dam we cannot pass without feeling and expressing a sense of gratitude to Dr. Barnum, who so generously gave to the profession so great a boon. Where to-day would be our fine contour fillings were it not for the dam that gives such perfect protection from moisture, relieves our nervous tension as well as our patient's. Dr. Barnum's generosity has received the plaudits of the profession, which even with little more of the substantial has demonstrated that we are ready to applaud the dentist who gives his discovery and inventive skill to the world *without a patent.* There is too much *trade*, gentlemen, among us for a profession that is clamoring for a high rank and urging its claims for recognition with older and well-established professions.

The variety of clamps in the market enables one to clamp every tooth of the thirty-two; and while we do not question the necessity of their use in many cases, we must condemn the wholesale use that some operators make of them, imposing

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unnecessary torture upon the patient, and in some cases leaving an irritation at the necks of the teeth that could have been easily avoided. The operator has also at the present time a simple apparatus for holding the buccal muscles away from the surface of the teeth, which is in some cases a great convenience and has the rare merit of being out of the way in operating.

The subject of replanting and transplanting of teeth your committee decline to discuss at this time. Cases rarely occur where it is advisable to resort to either. The practice is old and its rules well-defined to the skilful dental surgeon.

In conclusion we would remark that some of the subjects referred to in this paper deserve more extended discussion and elucidation, which they will doubtless receive. We all at last come to one conclusion, viz. that a large majority of our best operators possess that individuality that compels us to concede that his style and his peculiar instruments are the best thing in his case, while another operator of equal merit could do scarcely anything in adopting his ways or his instruments. The man opposite the business end of any instrument either gives it value or makes it a stumbling block.

We hope to be able to defend the conclusions arrived at in this paper, which is now respectfully submitted for your consideration; but if found to be wrong we are open to conviction, and will most gladly be set right.

Thanking you, gentlemen, for the kind attention you have given this well-worn subject, we submit the paper to the Association.

August 1877.

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The subject of Operative Surgery being open for discussion, DR. TAFT said :—

Mr. Chairman, so many points have been presented this afternoon and evening, that one hardly knows where to begin and what subject to take up. I do not propose to go into any subject in detail. There seems to be a disposition on the part of some to destroy the exposed pulps in most cases where they are found. I hope there are none here to-night who would not, in all cases, save alive the exposed pulps of teeth. The ground taken in a paper that I heard read a few days ago was, that after the tooth was developed, the pulp was then no longer of any value, and that the best thing to do with it was to get it out of the way as quickly as possible. Now I regard the pulp as of very great value. It is of value to a tooth for nutrition as long as it is to remain in the mouth. That is a very important matter. Every close observer will have found abundant evidence of that statement in the fact that a pulpless tooth is far more liable to decay than a live one. Take two teeth, one with a living pulp, another with a dead pulp, with cavities about the same size at the surface, and this will be found to be the result. Another fact will be borne in mind, that terrible inflammation of the periosteum and all other diseases of this structure are more likely to occur if the pulp is dead. Now the pulp becomes exposed in either of two or three ways. One is by decay, another is by wearing down of the crown. Another way with which some of us have been familiar is by the too extensive use of the excavator. This should not occur, however, with those who have had much experience. It seems to me there is hardly any occasion for an accident of that kind.

Now when a pulp becomes exposed, what shall be done with it? The proper course is pretty nearly indicated in the paper read this evening. When a pulp is exposed, it should be restored as nearly as possible to its natural condition. If a pulp should be exposed by an accident, it should and can be at once protected. I do not like the term "capping nerves." It conveys an unpleasant idea to me. I prefer to say covering or protecting the pulp. Now when an exposed pulp is as near a healthy condition as possible, what shall be done for it? It ought to be placed as nearly in the condition of the original as possible. Then, what is indicated? The pulp should be covered by some material that can be applied to it and occupy all the space without making pressure upon it. All the space should be occupied, and yet no pressure made by the material with which it is covered. That is one requirement. Then the material should be acceptable to the pulp. It should have such a surface as would be received by the pulp. It should be

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a substance that would not produce irritation by its roughness. Another thing, the material placed in contact with the pulp should be one that would transmit thermal changes as little as the pulp itself. Now these are some of the requirements for material covering the pulp. If you can find a material that will answer these requirements, you can safely cover it up, and in a great majority of cases success will attend the operation. I do not believe oxychloride of zinc to be a good thing to be placed upon an exposed pulp; but with a covering of creasote or carbolic acid placed on the nerve, it can be used as a covering without endangering the pulp. Now it seems to me every one may attain a large majority of success by pursuing this practice. I regard it as very important that the pulp of a tooth, where it is at all possible, should be saved, and I do not in any case destroy the pulp because there is active inflammation there or because it has been giving pain for many days. There may perhaps be other circumstances out of which difficulties may arise, but these are only occasional and not of sufficiently frequent occurrence to be regarded as an obstacle in the way of restoration.

DR. FORD:—

Mr. President, I think this thing of destroying every pulp is simply absurd. I remember when I was a student it was a very common thing, and often a tooth was extracted that could be very readily saved now. For the last ten years I have not thought of using nerve paste. I have a mode very nearly the same as Dr. McLain's. I have frequently used a solution something like his where the pulp was very nearly exposed. I have used Japanese bibulous paper. I use the Japanese because it is silk. French paper, I presume, is cotton. I did at one time use india-rubber dissolved. But I have for some time used what is called cement-lac. Eight years ago it was sold to cover oxychloride. I take that, it is dissolved in chloroform, I cut a little piece of bibulous paper, after the whole cavity is prepared, and place that immediately over the exposed pulp, and then put on my cement-lac.

I do not object to the term "capping" so long as we do it. I have gone so far with the capping of pulps that there is a gentleman in our State who has a bicuspid that I capped on both sides. He is over thirty years of age. It has been done seven years, and I am positive that tooth is alive. I had a case of a left superior first molar in a lad's mouth. He was about fourteen. It had been aching him for more than a month. I capped it, and put in a temporary filling so as to fill it at some subsequent time. He came in about a month and a half ago with another in the same condition, so I capped that

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one in the same way. His mother brought him, and it had been aching considerably. He had no trouble.

With regard to the remark that Dr. Taft made about a tooth having no further use for the pulp after it was fully developed, I cannot understand what sort of a dentist a man must be to say that the pulp is of no earthly use after the tooth has its full growth. There was one remark made by Dr. McLain in his paper; he spoke of the vacuum filled with air. I never heard of a vacuum filled with air. He also says he objects to wood creasote being passed through a fistulous opening to cure abscess. I have had a great many cases of front teeth: I see no trouble at all. One application will be all that is necessary, if you make it carefully. The six year molar was spoken of also. That is one thing that interests me greatly. We have to discriminate very carefully. I have filled when I think I should have extracted them, and *vice versa*. I do not know that there is anything further that I could offer.

On motion of Dr. Donaldson, the subject was laid over for future discussion, if time would allow of its being again taken up.

On motion of Dr. Taft, the United Meeting adjourned.

OAKLAND, *August 16th*, 1877.

Prior to the sessions, clinics were performed by Drs. Atkinson and King.

MORNING SESSION, THIRD DAY.

The United Meeting was called to order at the hour named in the order of business.

The minutes of yesterday's sessions were read and approved.

The following gentlemen, by complying with the requirements of the Constitution, became members of the American Dental Convention, viz.: Drs. Corydon Palmer, of New York; N. Y. Davidson, of London, Eng.; F. M. Odell, of New York;

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L. K. Hummelsheim, of Cumberland, Md.; Chas. E. Kells, of New Orleans, La.; and M. G. Burns, of Maryland.

Dr. Charles E. Busey, of Baltimore, Md., was elected an active member of the Maryland and District of Columbia Association.

Dr. H. C. Thompson, Chairman of the Committee on Anæsthesia, read the following paper for the Maryland and District of Columbia Association:

Mr. President and Gentlemen of the State of Maryland and District of Columbia Dental Association:— I would respectfully state that I have pursued a line of experiments during the past year, with the object of bringing into view the true action of anæsthetics on the human system. I have in the course of these experiments kept in sight two objects: first, to accept theories of others engaged in a like pursuit, I must substantiate their theories by following the same line of experiments before accepting them as facts; secondly, that to elicit new facts bearing on the subject I must not confine myself to the course alone followed by others, but instead be as diverse as possible. Under these considerations I have repeated many of the experiments of accepted writers on the subject — Bartholow, Anstie, Woods, Simpson, and others—besides a number of original experiments with chloroform, ether, nitrous oxide, and electricity, together with use of restoratives. I consider it unnecessary to give in detail experiments stated in text-books on this subject, but would refer you to Anstie and others, with most of which you are doubtless familiar; but will review their conclusions to such an extent as is necessary to corroborate theories resulting from original experiments.

In pursuing the study of anæsthetics I take due notice of the fact that this subject is one of the gravest, and that the consequent responsibility should lead us to cling to facts alone, and make no assertion which cannot be borne out by demonstration; as there always has been, and always will be a certain class of practitioners who prey on the assertions of others, be they those of the enthusiast, whose desire for discovery leads him to jump at conclusions, or of the careful student, who first verifies a fact before giving it to the public. We should bear in mind that every theory advanced will find some who are willing to advocate it, be it in the right or wrong. The study of anæsthetics is a life-long occupation, not alone from its importance to suffering humanity, but from the fact of the increase of the practice of its administration, the growing confidence of the public in its safety, and the consequent

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abuse of it by persons who are ignorant of its effect. It is for the careful student to come forward and educate the public to an extent that will preclude that trading on credulity which is seemingly so successfully accomplished in the present day.

The condition of anæsthesia is one of the most dangerous to life, and to the intelligent observer it is a source of astonishment that human beings can be carried so near the portals of death by suspension of vitality with so few fatal results. Only a short time past this condition, which is now so familiar to us, in all cases excited great apprehension; and to-day when these effects are brought on by narcotics administered for other purposes than to bring about anæsthetic condition, they cause the greatest solicitude and anxiety as to the ultimate results. It is for the investigative mind of this day to place these agents on such a footing that all sources of danger can be met promptly and efficiently.

This cannot be done in a short time, for it requires much study carefully pursued. According to one of our best anæsthetists, Dr. Squibbs, "an anæsthetic is an agent which produces anæsthesia by being received into the lungs in the form of vapor or gas, passing with the blood to the nervous centres, on which the action is exerted," to which may be added, or by absorption into the circulation in any manner. Examples: chloroform, ether, nitrous oxide. Using these definitions, we find the discovery of modern anæsthesia to be the bringing to light or making known what was before unknown, viz. that the body can be rendered insensible to surgical pain by the inhalation or absorption of any of the above-named substances; but owing to a lack of confidence in its efficacy in surgical operations it lay dormant for years, no one seeming to have a desire to investigate the subject until within a short time past, when such men (all honor to their memory) as Wells, Long, Norton and others gave the results to the medical and surgical world, to improve on from time to time.

The commonly accepted theory of the condition essential to anæsthesia is that of a diminution in the process of oxidation in the sensorium, this diminution occurring primarily in the tissues where oxidation occurs, bringing about the secondary effects of suffocation or partial asphyxia in the organs of respiration and circulation — the agent itself having the power of preventing the admission of oxygen, which should be normally assimilated into the organs presiding over vitality. Thus in the same proportion that this assimilation is retarded will be the depth of the anæsthetic state. The different degrees being, first, as a stimulant, from the alteration in the condition of the circulation by contact with a foreign substance, together with the nervous excitement attendant upon

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the operation; second, partial anæsthesia; third, deep or profound anæsthesia. These three degrees of a condition can be well distinguished one from the other, yet it cannot be said that they are distinctly separate; for they are only a difference of depth of the action which, carried to a greater degree, will end life by a cessation of assimilation, bringing about complete asphyxia from the accumulation of carbonic acid gas and almost entire loss of oxygen.

I have thought proper to sketch in a general way the conclusions which have been arrived at in the course of experimentations, knowing at the same time my liability to differ from many in their views on this subject; but if this difference will provoke discussion from which more light can be gleaned, then a great step will have been accomplished.

These conclusions are classified as follows: first, local action on the nerves; second, effects on the general nervous system; third, effects on the sympathetic system; fourth, effects on circulation and respiration. It has long been an established fact that an exposed nerve, when brought in contact with ether or chloroform, undergoes a marked change, which renders it devoid of functional activity, as proven by Anstie in his experiments on the peritoneum. In these experiments he has demonstrated clearly that bringing these agents in contact with the nerves direct by injection, the full effects of the anæsthetics can be produced. Although this contact with an agent in a concentrated form proves that by absorption direct the nerves can be affected, yet it cannot be inferred that the same action can be brought about by indirect action through the unabraded skin. That the general action on the nervous system can be produced by impregnation of the circulatory system only, and not then until this impregnation has extended to the smallest ramifications of the arteries, when the phenomena attending paralysis are developed; in which connection it would be well to notice that the symptoms of this paralysis are first developed in the inferior extremities, extending forward and upward, the last to yield being the matrix of the great toe, generative organs, ala nasi and sclerotica.

Among the first symptoms of paralysis of the sympathetic nerves can be noted the flushing of the face, which is almost the invariable symptom where stimulants, such as ether and nitrous oxide, are used; this, accompanied by the copious secretion of saliva, are some of the most patent symptoms of narcosis. The further effects on the great sympathetic are noted as the administration of the agent proceeds, its effect on the circulation varying according to the rapidity with which the anæsthetic is administered and the susceptibility of the system of the subject to whom it is administered. The

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effects on the brain are earliest seen from the mental disturbance, delirium, &c., the vanishing of timidity, loss of direct consciousness, followed by loss of power of co-ordination of motion.

The effects of narcotics on the respiratory action are variable. Where the agent is administered slowly and gradually with sufficient dilution, there is generally but little marked increase in the rapidity of the action of the lungs after the narcotic effect begins; but the force is gradually impaired as the effects proceed, and the frequency gradually falls below the normal rate, becoming soft and slow, until it sinks into stertor. While in the condition of unconsciousness the respiration should continue regular, for any change indicates that the narcotic action is proceeding in a dangerous manner, and that the medulla is being affected to an extent of losing its influence over the co-ordinate movements of the respiratory muscles. That the hurrying or slackening of the respiratory movements is dependent on a depressing influence of the agent on the excited nerve is fully proven by experiments with stimulants, which in some cases calm and in others reanimate.

Relative to the circulatory and respiratory changes occasioned by alarm during the administration of an agent, we must not confound them when occasioned by alarm with the narcotic action, for this is one of the greatest sources of difficulty which beset the anæsthetist when watching the process of narcosis. Of course this does not apply to the changes which occur after unconsciousness has been brought about. We find this difficulty very great in pursuing experiments on animals, which when undergoing these experiments are generally in an excited state, which has to be overcome by administration of some diffusive stimulant to counteract it. But in man as a rule these steps should be resorted to as little as possible, for when the human system is acted on by anæsthetics, the nearer the normal condition that system is in, the more accurately can we determine the successive degrees of the effects of the agent. This rule may be departed from in some cases—when the system is in a condition of prostration resulting from disease, &c. My experiments under this head have consisted of the administration of ammoniated tincture valerian to animals where depression existed; also the use of electricity after repeated experiments with sedative narcotics.

It has been noted that during these experiments, in cases of this kind where the diffusive stimulant was not administered frequently, death supervened soon after narcosis began, and that generally by the lungs when stimulant narcotics were exhibited, and by cardiac syncope where sedatives were used; that the depressed system when slightly stimulated is more rapidly acted upon than when not stimulated after depression.

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But as a general rule, if the mind of the patient can be brought to a normal condition when under excitement without the use of artificial stimulants, the corresponding depression will be overcome and the result happier accordingly.

The first effects on the circulation are observed in the increase of frequency, with a diminution of force of pulsations, which, as the poisonous effects are induced, become weaker, and the frequency undergoes a change, becoming slow and irregular until the fatal termination.

In experiments where large quantities of sedative agents are thrown rapidly into the circulation, the above symptoms are contraindicated, for where the direct action on the nerves of the heart is affected, as from chloroform administered in concentrated form, the pulsations become depressed both in force and frequency; this is also the case where stimulants are administered in the same form. But where the narcosis is effected by degrees, the circulatory action runs a seemingly parallel course with the general paralysing influence of the agent on the nervous system, and the co-ordinate movements of the heart are arrested in the same proportion as the co-ordinate nerve influence is removed from it, thus showing that a strong impression made upon the heart through the nerves of that organ, or indirectly through the brain, may arrest its action instantaneously; and there seems to be little doubt that certain agents have a peculiar tendency to induce death by syncope, and others to produce it by the arrest of the respiratory action.

Experimentation on this point convinces the observer that chloroform alone has the power of stopping the heart's action directly, because of the deeper effects of this agent being almost exclusively confined to the heart, although this agent, in the earlier stages of its administration, may be so exhibited as to produce excitement and intoxication, or carried to complete asphyxia mechanically, by complete exclusion of atmospheric air.

Another point under this head is that of dilatation and contraction of the pupil. It is as yet a mooted question whether this symptom can be classed under the head of nervous circulatory phenomena produced by narcosis, but so far as we can educe from experiment, it seems to be dependent upon the circulatory system in the earlier stages of paralysis, after which the marked alterations occur as the loss of co-ordinate muscular power proceeds.

Another interesting symptom of the action on the circulatory system (although indirect) is that already mentioned in connection with the nervous system—the flushing of the face. This is one of the earliest symptoms of narcosis, and attends the action of almost every anæsthetic agent. It seems to be due to irritation of the sympathetic facial nerves.

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Mr. President, I feel that I have consumed much of the time of this Society, but before closing this report, I would call attention to another interesting point in connection with this subject—it is that of restoratives from dangerous conditions resulting from anæsthesia. In a paper presented by C. W. Spicer, M. D., to the Philadelphia Medical and Surgical Reporter, he stated, "that the teaching of Nelaton was that death from chloroform is due to syncope or cerebral anemia, and to prove his position cites several cases of apparent death from chloroform, or chloric ether, which recovered by the use of reversed or semi-reversed vertical position, with artificial respiration." I would respectfully submit that the learned Nelaton seems to have lost sight of the fact that an anemia of the brain is secondary to the cessation of the heart's action, and that to restore vitality to the brain requires that the heart's action should first be restored. The theory of gravitation of the blood is no doubt a good one when made accessory to an agent that will stimulate the heart into activity and bring about this gravitation. For the latter purpose we can find nothing better than the use of electricity; and in this connection it will be well to refer to a paper written by Dr. Caldwell, of this Society, and reported by the Virginia Medical Journal, Nov. 1874, on the results of the application of electricity in the resuscitation of cases suffering from poisonous effects of narcotics, and to the theory of the application of electric currents in such cases.

"Case I.—In the latter part of the summer of 1873, I was called, late in the night, to see a little child suffering from a poisonous dose of laudanum. The messenger bore a note from her professional attendant, Professor Murray, of this city, stating that as he had exhausted all other means without benefit, he had concluded to try faradism, at the same time inviting me to join him with my battery. We found the patient to be deeply narcotized from an accidental dose of laudanum, taken some twelve hours previously. The current was passed by placing the positive pole over the pneumogastric nerve at the angle of the sterno-cleido-mastoid muscle, whilst the negative pole was placed upon the epigastrium. A powerful primary current was applied and continued for more than three hours, with the happy result of complete restoration, encouraging and urging the respirations from eight or nine up to eighteen or twenty per minute, at which point the pupils became dilated, the pulse normal, and the sensorium capable of acknowledging the previous remedies. Hence vomiting and purging followed, and the patient's life saved thereby.

"Case II.—On May 11th, 1874, I was summoned to the 'Maryland Inebriate Asylum' to attend the case of an at-

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tempted suicide in the person of one of the inmates, who had taken a poisonous dose of opium. The usual remedies having been ineffectually resorted to by the accomplished physician of the institution, Dr. Parrish, he requested my attendance with a battery ready for use. We found the patient in an unconscious state. A faradic battery was applied about 3 A. M., and continued constantly in use until 7 A. M., during which time the respirations were increased from seven per minute to eighteen, with the same results as we had before."

Another case is that reported in the Medical and Surgical Reporter, May 9th, 1874, of a female suffering from an overdose of morphia and chloral. In this case resuscitation was accomplished after fourteen hours' use of the electric current. There are many other cases recorded, but the desire is to take these as typical cases of profound narcosis and the antidote.

In his paper Dr. Caldwell shows by experiment that "the toxic condition produced by chloroform or other anæsthetics may be remedied much in the same way; that is to say, by appealing to the vaso-motor centres through the pneumogastric axis. For experiments illustrating the influence of *anæsthetics* on the vaso-motor centres, permit me to extract briefly from a late and able paper by Drs. Bowditch and Minot, read before the Boston Society of Medical Science, and reported in the *Boston Medical and Surgical Journal* of May, 1874:

"Anæsthetics in producing insensibility to pain accomplish such result by antagonizing the effects of irritation of sensitive nerves. One of the most constant physiological results of irritation of a sensitive nerve is a rise of arterial blood tension, due to a reflex stimulation through the vaso-motor centres of the muscular walls of the smaller arteries, especially those of the intestines. It is ascertained that in the majority of cases the rise of blood tension consequent upon the irritation of the *saphenous* nerve, is less marked when the animal is under the influence of ether than when the anæsthetic is not used.

"The first object was to determine the effects of anæsthesia on this reflex rise of blood tension. This was accomplished in the following manner: An animal being placed on the operating table in the supine position, a solution of *curare* was injected into the jugular vein, when paralysis ensued. When the respiratory movements ceased, the trachea was connected by means of a glass canula inserted into it with the apparatus for artificial respiration, which was so adjusted as to imitate as closely as possible the normal respiratory rhythm. A canula was then placed in the carotid artery and connected with a mercury manometer, carrying a pen, by means of which the blood tension was recorded on a long strip of paper, which was kept in uniform motion by clock-work. The

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saphenous nerve was then placed upon electrodes. The irritation of the nerve was produced by closing the currents, by means of a key provided with a pen; thus recording the blood tension which could be seen at a glance. After the anæsthetic had been administered, the nerve was again irritated. Then the blood tension was notably decreased, and so continued to be as long as these experiments were tried. But far more constant and obvious were the results obtained from chloroform. Here the irritation of the saphenous nerve caused a less marked rise in the blood tension, and sometimes there was no rise whatever."

These facts present undoubted evidence that the electrical restorative should be considered a favorable one in cases of deep toxemia from any anæsthetic agent; and I would dwell emphatically on the importance of having the battery complete and ready for use in all administrations of these agents. In the high estimate of this restorative, I do not lose sight of other methods which have been in vogue for many years past, that is, "Marshall Hall's method," Nelaton's, and others, but experimentation indicates that the time is not far distant when the latter will be considered as only accessory to the former.

In concluding this paper, it would be well to call attention to a paper by Dr. Le Brig, of London, as published by the London Practitioner, June 1877. In this paper the gentleman discusses a subject of much importance to anæsthetists: it is that of the impurities of drugs, more especially the narcotics. After showing by experiment how the impurities of chloroform and other anæsthetics affect the human system, he goes into a series of experiments showing how these impurities may be detected, &c.

Finally, Mr. President, on behalf of the committee which I represent, I would invite attention to a paper from the pen of another member of the committee, Dr. S. Waterman, of New York, on the subject of "Spectral Analysis as applied to Anæsthesia."

DR. WATERMAN read a paper on "The Beauties of the Spectroscope and its Relations to Anæsthetics," illustrating the subject by carefully prepared diagrams.

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THE EFFECT OF ANÆSTHETICS ON THE HUMAN SYSTEM, AS EVIDENCED BY SPECTROSCOPIC OBSERVATIONS.

Mr. President, Officers and Members of the Convention, Ladies and Gentlemen :— There is probably no difference of opinion in the profession, that a perfect anæsthetic, one possessing all the requisite properties to insure rapid action, complete safety, freedom from pernicious after effects, combined with cheapness and readiness in its preparation, would be one of the greatest boons to suffering humanity. And I am also certain that there exists no difference of opinion amongst us to-day that we do not as yet possess this boon; that none of the anæsthetics known to us at present possess all these priceless properties, and that in dealing with these subtle agents we are indeed passing the border-land which separates life from death. I think it must be conceded that all anæsthetical agents now employed are more or less dangerous to health and life, and their employment is beset with more or less grave consequences. In estimating the effects of an anæsthetic upon the human system, its mode of action should be critically known beforehand, not empirically only; we should be able to foretell what the action of a certain agent would be upon a given individual, by closely examining into its physical condition; and we should be fully able to appreciate the pathological states that forbid or modify its exhibition. To this end every rational practitioner is bound to understand the chemical composition of these wonderful agents, and, above all, what particular organ or fluid in the human economy is primarily affected by them, and also the precise manner of the changes which take place in the same. Those who imagine that all anæsthetics act upon the animal economy alike, and their peculiar mode of action is the same under all circumstances, have yet to learn that is far from being the case; that on the contrary, various agents affect the system in quite different ways.

This knowledge, pregnant with the utmost importance, has became almost positive through the agency of the spectroscope. It has supplied the missing link to our chain of reasoning; the shadowy field of theories has been cleared up; the laws governing the relations of anæsthetics, in contact with the blood current, have been ascertained, and rational progress has been made to insure safe anæsthetics. I have abiding faith in the progress of chemical science, that it will finally point out an agent from the almost inexhaustible

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material at its command that will satisfy all ends of surgical requirements — an anæsthetic that, while it will annihilate temporarily all sensation, will leave consciousness and vitality intact. We are the more entitled to entertain this hope, as we are already acquainted with some agents that, when locally employed, suspend the sensibility of the parts. Rigolene is one of them, otherwise known as pentlyn or hydrate of amyl, a light, fragrant fluid, the boiling point of which is 86° F. In the trimethylic ether we possess another remarkable agent of this class. Much of the knowledge we possess on these subjects has been supplied by the English savant, Dr. Richardson. I have clipped the following passage from his report of 1870: "In a previous report on amyline I pointed out that its vapor, whilst it destroys sensation, does not destroy all conscious acts; and in my later observations on the action of methylic ether, $C_7 H_{16} O_3$, the same facts have been more perfectly elicited. In several cases where I administered this ether for removing pain in surgical operations, the patients, when quite insensible to pain, were so conscious that they were able to obey every request made of them, and in some instances were anxious to reason, stating that they knew what was going on, and arguing that they were not ready for the operation because they were sure they would feel pain. Nevertheless in this state of mental activity they were operated on, and afterwards, while remembering every incident, were firm in their assertion that they felt no pain whatever during the operation. One patient, who sat for the extraction of two teeth, selected the tooth to be first extracted, putting her finger on it, and afterwards re-arranging her position for the second removal. To the looker-on it seemed in fact as though no change in her life had occurred, yet she affirmed that she was sensible of no pain whatever; and several other less striking, but hardly less singular, examples came before me.

"We may then, I think, fairly assume that in course of time we shall discover manageable and certain anæsthetic substances which will paralyze sensation only, leaving the muscular power unaltered, and the mental little disturbed; and we gather from this that, either in the cerebral hemisphere there is some distinct and simple centre of common sensation, which may be acted upon by certain agents without involving all the cerebral mass, or that the peripheral nervous matter may be influenced without involving those portions of the nervous system."

What Dr. Richardson here says is of the utmost importance on the subject before us. There may be cases where it may be useful, nay, necessary to suspend consciousness also, and we should be able to graduate our agent in a manner so as to

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push onward to any desirable degree without endangering the life of our patients.

Those who desire to learn more of this subject are referred to Dr. Richardson's most able and exhaustive report, and also to the highly interesting and admirable lecture by Prof. B. Silliman, Jr., of Yale, delivered to the medical class in Yale College, September 14, 1871, and afterwards printed in pamphlet form and in the *American Journal of Science and Art.*

I have already referred to the spectroscope, and told you that the spectral analytical test gives us most valuable information upon the subject before us. I propose now to make this assertion good. There may be many amongst my kind hearers that know all about the spectroscope and the work it can do and has done for chemistry and celestial and terrestrial physics. Others perhaps may have given the subject less attention. For the benefit of all, and in order to give a clear and satisfactory view, I shall speak as if this interesting subject were entirely new to you.

And in the first place, what is meant by the term "spectral analysis"?

It is a scientific process in which solar or artificial light is employed, in connection with a series of prisms, to analyse organic as well as inorganic substances. The instrument employed for this purpose is called a spectroscope, and when connected to a microscope we call it a micro-spectroscope. It consists of a number of prisms within telescopic tubes, and a slit arrangement so as to regulate the admission of light, and one or more collimator lenses to gather the rays and make them parallel. Through the movable slit the light enters and passes through the prism or prisms, and through one of the telescopic tubes the colored image or spectrum passes into the observer's eye and is appreciated by the retina. This image may also be thrown upon a white screen, a method that I would gladly resort to had I possession of the necessary screen arrangements. You all know what happens when a ray of white light passes through a prism. It is decomposed into its ultimate constituent colored tints, forming a beautiful band called the spectrum. It contains all the colors of the rainbow in regular succession of tints from red to orange, yellow, green, blue and violet. We witness also other interesting changes. When white light passes through a prism, the emerging rays are seen to have been bent out of their course. They spread fan-like to the left and to the right. They are dispersed, and we call it the refraction of rays. The violet part of the spectrum is greatly more bent out of its course than the red part, which is less refrangible. This deflection and greater refrangibility of the violet rays depends upon the constitution and nature of light itself, whose waves are propa-

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gated through space by a subtle fluid known as the "luminiferous ether, which fills the illimitable space and permeates every atom of matter. These etherial waves differ in length; the longest form the extreme red part of the visible spectrum, the shortest those of the extreme violet. According to Tyndal, the length of an etherial wave of the extreme red would require 36,918 placed end to end to cover one inch, whilst the extreme violet requires 64,631 to the inch." As the sun's light comes to us from a distance of 90,000,000 of miles, we can perceive the amazing number of waves and their inconceivable velocity, considering that these waves reach us in the short time of 8½ minutes. The number of ether impulses necessary to produce upon our retina the impression of red light is therefore 451 billions per second, and in order to produce the impression of extreme violet 789 billions are required. Impulses above as well as below these numbers fail to make any impression upon our retina.

This is indeed a captivating chapter of physics, but I am admonished that my subject lies in a different direction, to which I am in duty bound to return.

When the light we employ for analytical purposes is artificial, say the flame from an oil or petroleum lamp, or the magnesium or electric arc light, we see the tints pass imperceptibly, one into the other, and we have what is called an uninterrupted spectrum. When, however, sun-light is used, or the light from any planet that reflects the solar light, say the light of the moon, we find that the spectral band is traversed by thousands of fine lines, some darker and broader than others; such a spectrum is called an interrupted or solar spectrum. The inquiry into the cause of these solar lines is full of interest, but I have neither time nor space to enter fully into its considerations.

These captivating features of spectral analysis are applicable to solar and celestial physics, but are not absolutely necessary to the intense, logical inquiry before us. The lines which traverse the solar spectrum are constant, and never change position. They have been mapped by Thalen and Angstrœm and Kirchoff. Rutherford, of New York, has photographed a portion of them from the sun itself. Fraunhofer employed the most prominent of these lines for purposes of measurement as far back as 1814. He selected nine lines in various parts of the spectrum and named them A, B, C, D, E, F, b, G and H, and these lines are known the world over as Fraunhofer's lines. You will understand by-and-bye how useful these lines are in spectral analysis. These nine lines, and in fact every one of the thousands of lines that traverse the spectrum, represent some terrestrial substance in a vaporous condition in the sun; and we learn from these hieroglyphic

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lines, that the sun, the stars, the comets, and the nebulæ, the aurora borealis and the zodiacal light, which, according to the latest view, encircles our earth as Saturn is encircled by a triple set of rings, that in short all celestial bodies, without exception, contain substances or elements which we meet on our earth, thus bearing witness to the unity of the Universe.

The D line is produced by burning sodium; the lines C, F, and G are peculiar to burning hydrogen gas; the E line is one of the most prominent iron lines; the line b is produced by the vapors of magnesium, and the H line is characteristic of volatilized calcium. In our inquiries these lines serve us as landmarks to register the position of bright lines and absorption bands. Scales, graduated into tens and hundreds of degrees, are also employed and placed above the spectra dividing the color regions.

The process of making an analysis by means of the spectroscope is simple indeed. Bodies to be examined are either solids, liquids or gases. The solids are volatilized by means of heat. To this end we employ a Bunsen's burner, the electric arc, or the compound oxygen flame. Fluids are placed before the slit of the spectroscope in suitable glass vessels, with plane parallel walls. When the rays of light pass through colored solutions, ere they impinge upon the prism, various tints are absorbed. We observe a variety of dark bands varying in shades, in numbers, and in position in the spectral regions. There are no two substances at present known that give absolutely the same bands. Gases are examined by means of tubes devised by Pflucker & Geisler and known as Geisler's tubes. They are made of various sizes and shapes, some quite fanciful. They consist of thin thermometer tubes with a bulb at each extremity, into which electrodes of platinum or aluminum are soldered. Electrodes of other metals would oxydize in the extreme heat generated. The tubes are filled with the gas we wish to experiment upon. The air-pump is then applied until the 1-600 or 1-700 part of the ordinary atmospheric pressure is left. Then we pass an electric spark through the attenuated gas, which in this condition no longer resists the passage of the spark; intense heat is generated, and brilliant and beautiful lights emitted of various colors, changing of course with the different gases employed.

Being able then to master the solids, fluids, and gases, no known substance can escape the analytical power of the spectroscope. Every known substance modifies the spectrum in a manner specific or peculiar to itself. Some substances give only bright lines, for example the glowing gases; others give dark lines and absorption bands. Some absorb all the colors of the spectrum with the exception of a single bright line.

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Observe, in the subjoined diagram, the spectra of sodium and thallium. Others give a spectrum of many bright lines; compare the spectra of barium, caesium and rubidium.

It does seem at first sight, that the immense variety of lines and bands would lead us into inextricable confusion. A little practice will dispel this illusion however. We soon become familiar with these landmarks. The variety of the spectra, the relative position of bands and lines, their peculiar forms and outlines, difference in brightness, depth of shading of bands and their number in each instance, are characteristic enough to insure ready recognition, even by persons not accustomed to work with the spectroscope.

DELICACY OF THE SPECTRUM OR PRISMATIC TEST.

Let me say a few words regarding the extraordinary delicacy of the spectrum test, which far surpasses every other test known to us. The following example is supplied by Dr. Schellin: "Let us divide one pound of common table salt, the sodium chloride, into 500,000 equal parts. One of these minute dust particles is called a millogram. The experienced chemist is able to weigh such a minute particle only with the most delicate scales and with extraordinary care and acquired dexterity, but with this performance he has arrived at the limit of possibilities. And now ask the chemist to divide this millogram into further 3,000,000 equal parts, and he will shrink appalled from the performance of this impossible task. The human mind cannot conceive of an object so exceedingly minute. Yet we can demonstrate the presence of such an infinitesimal quantity of sodium chloride by the spectral test. You know that this salt is ever present in nature in extremely fine division. Its never failing source is the sea; fine particles of it are supplied to the air by the action of winds and storms and by the slower process of evaporation, thus supplying one of the most absolutely necessary elements to life in its manifold forms and conditions, and furnishing one of the most powerful antiseptics, whereby contamination of air, earth and water is prevented.

The dusting or slapping together of a dusty book in the remotest corner of this hall will immediately produce a yellow flash in a burning candle or gas flame at this end, which when examined with the spectroscope will show most distinctly the yellow line in D, which, as you have already been informed, is the sodium line.

There is another very peculiar and highly useful characteristic of the prismatic test, to which I desire to direct your attention. You can examine a number of spectra at one and the same time, that is, you can analyse a number of substances

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at the same time. Take for instance the ash obtained from the incineration of human, or animal, tissues. The hydrochlorate solution of this ash gives a splendid spectrum, the field of which shows many red, yellow, green and blue lines in various regions of a dark spectral ground. By careful comparison we find that these lines belong to six metals, to wit: potassium, sodium, lithium, rubidium, cæsium, and calcium. We can give another striking example. The ashed end of a cigar, moistened with hydrochloric acid and held in the flame of a Bunsen's burner, yields the lines of sodium, potassium, lithium, cæsium, rubidium, and calcium.—(*Thudicum's report to the Privy Council*, 1876.)

Four new metals were discovered by means of the spectroscope, of very great interest to science, which would otherwise, most probably, have never been known to us. Bunsen and Kirchhoff discovered in the waters of Durckheim, cæsium and rubidium. In boiling down forty tuns of its mineral waters, they found 200 grains of the mixed salts of the above metals, and by the marvellous analytical powers of the spectroscope identified these substances (1860). Since then these metals have been found in many other localities, especially rubidium, to which many of the most celebrated springs in Europe owe part of their curative powers. Thallium, a most important metal, was discovered by Crook, in 1861, in some of the iron pyrites and in a seliniferous deposit from a sulphuric acid factory at Telkerode, in the Hartz (*Roscoe*). Reich and Richter discovered, in the same way, the red metal indium, (1864) on account of its spectrum, two indigo-blue lines.

You may rightly conjecture that an instrument possessing such wonderful analytical powers, must have found application in manufactures, arts and sciences; its influence upon celestial chemistry is simply stupendous; it has completely revolutionized our views in this direction. A comparison of the dark lines of the sun and its planets with those of Sirius and other fixed stars, shows us that the same substances known to us are present in all these. Differently arranged as those lines are in different stars, many of them are sufficiently coincident to establish their identity. When we come to examine the irresolvable nebulous mass, we obtain no longer dark lines, but bright lines only; and we learn thereby, that these bodies consist of burning gases, principally hydrogen, which is also so abundant in the sun, where, during the fire storms raging there, it is carried up with explosive force many hundred thousand miles in the shape of fiery columns.

As we come down to the still lower grade of cosmic evolution, to the nebulous mass, even these bright lines diminish in number, until but a few of them remain visible. One line in F seems to be always present, the line is nearly coincident

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with the hydrogen line; another seems to indicate the presence of nitrogen, and still another has not as yet been identified.

In the comets all the bright lines have disappeared. Faintly illuminated spots mark the place where, in ages to come, bright lines will appear. These spots correspond to the spectrum of carbon, and one of these comet worlds may weigh only a few hundred pounds, and may not contain more solid matter than can be stowed in one's hat.

In time to come, when the comet's cosmic dust will have been contracted and condensed, and heat and light will have been evolved, bright lines will mark its progress, and in due time again, as condensation progresses, dark lines such as we now observe in the spectrum of our own sun, in the spectrum of Sirius and that of a host of other stars, will become visible, and in many, many million years perhaps, when our own sun system shall have become old and frigid, and its light and heat shall have been dimmed and exhausted, and life has become extinct in consequence thereof, the host of nebulous bodies, now in progress of being born, will assume all the brightness of our present sun, and light up the chaos consequent upon the disappearance of our present sun system.

I have scarcely any time left to point out the use of the spectroscope in the arts and manufactures. You must be satisfied with one example. You have heard of Bessemer steel. Steel differs from iron in containing less carbon. In the Bessemer process, carbon and silicon are burned out by oxygen, contained in a blast of atmospheric air which is thrown through the mass of molten iron. Formerly the manufacture of Bessemer steel was surrounded by great difficulty, for it is necessary to recognize the exact moment when all carbon is burned out of the iron. When this exact moment has arrived, the operation must be stopped instantly; ten seconds more or less will destroy the entire cast. The spectroscope shows this exact moment when the process is finished, and makes the manufacture of Bessemer steel at once an easy and successful task.

I think I have touched, like Ithuriel's spear, lightly upon the most salient, technical points necessary, so that you may understand in how varied a manner the spectroscope may be utilized.

We come now to its application in medicine, and I claim that its usefulness and importance here is second to none I have already mentioned.

But to understand how it can show us the effect of anæsthetics upon the human system, we must be familiar with the constitution of the blood, and learn the optic relations of this vital fluid to the spectroscope, in health and disease.

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The optic phenomena of blood were not known prior to 1864, when almost simultaneously, Hoppe Seyler, in Tubingen, Germany, and Dr. G. G. Stokes, in England, investigated this subject. Stokes pointed out the fact that blood causes a peculiarly strong absorption of light in the yellow and green part of the spectrum. In order to observe this absorption well, the blood should be properly diluted, for in its concentrated state the absorption bands between D and E cannot be observed at all. These two bands are beautifully dark or black, the first, which is narrow, more so than the second, which is broader; both are known as the spectral bands of oxidized blood. But blood can exist in a double state of oxidation; that is, it may also exist in a state of complete deoxidation. The oxidized blood corresponds to the arterial, the de-oxidized to the venous blood. When the blood is deoxidized, the two bands disappear, and are replaced by one dark, broad band, known as Stokes' reduction band. This black band, filling the space between D and E, appears whenever the blood is deprived of its oxygen, which it loosely binds. This de-oxidation may be effected by mechanical as well as chemical means. The blood is then called reduced or de-oxidized blood.

We may deprive blood of its oxygen mechanically by means of an air-pump favored by heat. Chemically, blood may be deprived of its oxygen by substances which have an energetic affinity for oxygen and absorb it whenever they find it—tin oxydul, ammonium sulphide, and others. Blood thus reduced, or de-oxidized, may be rapidly re-oxidized by shaking up the solution with atmospheric air.

The spectroscope is not idle during these changes; the reduction invariably causes the appearance of Stokes' reduction band; the re-oxidation causes the re-appearance of the two beautiful bands between D and E. The same changes take place in the living economy.

In the meantime the discovery was made, that blood contained a crystallizable material called hæmato-crystalline, also hæmo-globulin and cruorine. The great practical importance of this substance must be my apology for entering more minutely into its consideration.

Hæmato-crystalline is the agent through which oxygen is abstracted from the air, and loosely bound in the circulation. Take this crystallizable matter out of the blood and the residue, consisting of albumen, globuline, protagon, cholesterine, sulphur, iron, and some salts, will be quite unable to effect this attraction of oxygen. Hæmato-crystalline saturates itself in the lungs with oxygen, it carries its precious burden into the sanguineous circulation, and sustains there the energies of respiration, oxidation, and oxygenation. In its course it gives up

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its oxygen thus absorbed, to all oxidizable tissues with which it comes in contact, and in exchange unites with carbonic acid, which through the venous circulation is brought back to the lungs for elimination, by a process not yet fully understood.—(*Hoppe Seyler.*)

It must be evident to you, that so long as the hæmato-crystalline of the blood remains intact, the same in quantity as in quality, the supply of oxygen to the living economy is subject to relatively unimportant oscillations, and that with the increase or decrease of this substance, or with any change in its integrity, rises or falls the vital capacity of an individual's life.

That it is beyond any question, the hæmato-crystalline, and not any other substance of the blood which enters into and sustains the vital exchanges between the oxygen and carbonic acid, is fully proved by spectral observation. Hæmato-cryst. artificially prepared and in solution, is able to absorb oxygen as well as carbonic acid with great rapidity. It presents two states of oxidation, the arterial and venous. It can be oxidized and de-oxidized at pleasure; it presents the same absorption bands as blood; it can be reduced, and when shaken up with air can be readily re-oxidized. It presents the same optical changes when reduced or altered. It enters the same combination with irrespirable gases, in short all and every chemical and optical appearance which blood presents when acted upon by chemical as well as mechanical agencies, are also observed when these agents act upon a solution of hæmato-crystalline.

Highly interesting experiments instituted by Pfluger upon dogs have given us information of the rapidity with which oxygen is used up in the living animal economy. This physicist forced these animals to inhale nitrogen, which you know does not support respiration. In thirty seconds the highest point of dyspnœa was reached. At this point some blood was abstracted, under the necessary precautions, and then tested for oxygen. It was found that its oxygen was reduced to a minimum, being 1 to 2 per cent., whilst the blood abstracted from the same animal immediately before it was forced to inhale the nitrogen, contained 18.6 per cent. of the vital gas. As soon as the animals were permitted again to inhale the pure air the dyspnœa disappeared, and they seemed as well as ever.

You perceive, gentlemen, I have guided you gradually up the hill, from which your views will become clearer and fuller. If you will but grasp these facts presented to you, you will have no difficulty in mastering what follows.

Were it possible to observe in the spectroscope the changes taking place in the blood of such a suffocating dog, we would witness a rapid fading away of the two oxygen bands between D and E, and towards the end of the catastrophe one dark

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band would take their place, the reduced or de-oxidized band of Stokes; and by the time this band had obtained its full extension and its full depth of shading, poor dog Tray will have gone to his eternal hunting-ground.

And here comes in the first great lesson in the administration of anæsthetics: "That suffocation will rapidly ensue where anæsthetics are used, which cannot sustain respiration, or which is still worse, abstract what supply of oxygen the blood has stored up, unless a sufficient supply of atmospheric air is permitted to be inhaled to sustain life at the same time."

The great rapidity with which the dogs experimented upon recovered, shows us that the blood itself had not been fatally injured or altered. In taking the blood drawn at the height of dyspnœa and shaking it up with air, the spectroscope would have promptly informed us of the reappearance of the two oxygen blood bands, in full depth of shading.

To Pfluger's experiments we owe another series of important facts. The amount of oxygen contained in the animal and human blood is 16.9 per cent. Blood-serum contains less than one per cent. The more compact and normal the blood, the more numerous the blood corpuscles are, the greater is the per centage of hæmato-crystalline, the greater is also its capacity to absorb oxygen; the poorer the blood, the smaller is its amount. One grain of hæmato-crystalline is able to bind 1.27 c. c. of oxygen.

When we examine spectroscopically the blood of chlorotic persons, or that of persons who have sustained severe hemorrhages, or who suffer from pernicious anemia, Bright's disease, fatty degeneration of the heart, or the blood of persons in whom disease has reduced the crystallizable coloring pigment of the blood, as in the case after cholera, typhoid and other diseases, we find the bands paler, and know at once that the normal amount of oxygen is wanting in such individuals.

Here then comes in our second great lesson. In all cases, due inquiry should be made into the history of the person who is to be placed under the influence of anæsthetics, and if it is found that any of the diseases enumerated above have been present, and that the hæmato-crystalline has been reduced by disintegration and retrogressive processes, leaving your patient with pallid countenance and defective heart's action, be on your guard, for what remains of the vitalized blood may not be able to resist the effect which your anæsthetic is apt to produce, because in these conditions every anæsthetic agent is dangerous.

Let me briefly make you acquainted with agents which permanently alter the blood. All acids as well as nearly all alkalies are such agents. With these changes we witness corresponding changes in the spectrum, quite definite and character-

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istic. Here you see on the diagram various spectra resulting: Hæmatin and cruentine, hæmatoidin, hæmin. I have no time to dwell upon their great importance in spectral analytical investigation, but will refer to them by-and-bye.

The blood crystals of which we have so often spoken are not found in crystalline form in the blood. They are present there in solution joined to an alkali, probably to potassa carbonate, forming hæmo-globulate of potassa (Preyer). Hæmato-crystalline is a weak acid. It can be produced pure, but its preparation is difficult. It crystallizes in rhombic prisms of great beauty and bright red color.

AFFINITY FOR IRRESPIRABLE GASES.

Wonderful as are the functions of this crystalline material, it possesses qualities whereby destruction to life is invited and facilitated. They have an exceedingly energetic affinity for irrespirable and poisonous gases, with some of which they enter into close and inseparable combinations, thereby sacrificing their own integrity and life-supporting power forever. Some of these irrespirable gases simply disable the hæmato-cryst. of the blood to absorb oxygen; others consume all the oxygen of the blood to satisfy their own keen affinity for this gas; others cause a cleavage, or true chemolysis of the hæmato-cryst. combining with its alkaline base setting free the crystallizable material, whilst still others cause several of these effects to take place at one and the same time.

When a cleavage of the blood material has taken place, the disintegrated elements become foreign bodies and must be eliminated and carried from the system.

Preyer's experiments upon the dogs remind you how rapidly the oxygen is consumed in the animal economy, and how necessary it is to supply the defect in an equally speedy way; and you can understand how rapidly a fatal result must ensue from the action of anæsthetics which cannot supply the defect, and which in addition greedily appropriate the oxygen which the blood may have stored up and still further destroy the integrity of the hæmato-cryst. in a manner so as to paralyse its vital functions. Some of these combinations can be obtained in crystalline form. We can thus produce the prussic acid, the carbonic oxide, and the nitric oxide hæmato-crystalline. The combinations are far more stable than the normal oxy-hæmato-crystals are.

When blood has once entered into a permanent crystalline union with nitrous oxide gas, we know as yet of no chemical process to restore the resulting nitrous oxide hæmato-crystalline to its normal condition. No electric current possesses the power to restore the primitive integrity of the blood when once brought into this fixed condition.

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Recently Donders and Zuntz have demonstrated, and Podalinsky and Eulenburg have corroborated, that the hæmato-crystalline may be released from the deadly grasp of carbonic oxide by means of carbonic acid, hydrogen and oxygen being persistently passed through a solution of carbonic oxide hæmato-cryst., so that the blood band of Stokes, and finally the two bands of oxy-hæmato-cryst. may be reproduced. Whether such a process would succeed in case of blood saturated with nitrous oxide, whose grasp upon the oxygen of the blood is far more tenacious, is a question which cannot be answered at present.

NITROUS OXIDE GAS.

Let us begin with this gas, the so-called laughing gas, the one so extensively used by surgeons and dentists, and by many considered a serviceable and harmless agent.

It has been demonstrated by Herrman and verified by Hoppe Seyler, Gorup Besanez and W. Preyer, that nitrous oxide gas possesses a keen affinity for oxidized blood, as well as for artificial oxy-hæmato-crystalline in solution. The affinity is so strong that when a current of this gas is passed through a solution saturated with carbonic oxide hæmato-crystalline, the carbonic oxide is driven out by the nitrous oxide, which takes its place volume for volume.

When a current of nitrous oxide gas is forced through a slightly alkaline solution of hæmato-crystalline, the solution loses its dichroism and assumes a slight cormoisin red color. When the solution is placed before the spectroscope we observe that in proportion that the gas exerts its influence the two bands between D and E fade away, and disappear finally altogether, and there is a moment, says Preyer, "when the spectrum is continuous."

The disappearance of these blood bands means here, as it means in other instances, disappearance of oxygen from the blood or complete deoxidation, and unless a fresh supply is speedily furnished suffocation must ensue.

As the action of nitrous oxide gas upon the blood solution continues, soon after the fading away of the two bands, two new bands appear resembling the oxy-blood bands, but differing from them in position and depth of shading; they are paler and more blurred in outlines.

Please remember in this connection what I said to you about Stokes' reduction band. I then told you that when blood is simply deprived of its oxygen, the blood reduction band would follow the disappearance of the two oxidized broad bands; and that then the simple contact of atmospheric air with such de-oxidized blood solution would suffice to cause the reappearance of the two oxygen blood bands.

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But we see here, that instead of Stokes' band, two entirely new bands have made their appearance; and when such blood, saturated with the nitrous oxide, is then submitted to the action of reducing agents, the broad band of Stokes, the reduction band, can no longer be produced at all, proving that a more permanent change has taken place in the vital chemistry of the blood.

When a current of nitrous oxide gas is passed through a blood solution not made previously alkaline, still further changes take place. Here a portion of the nitrous oxide gas rapidly oxidizes at the expense of the oxygen of the blood, and forms hyponitric acid. Preyer holds that this hyponitric acid unites with the hæmato-cryst. of the blood in its nascent state. Like all acids, it alters and suspends the coagulability of the blood, and initiates other important chemical and optical changes. This event is marked by the appearance of an absorption in red to the left of D, from the 53° on Preyer's scale towards D, and another one between b and F. I look upon the appearance of this absorption in red as an indication that hyponitric acid has formed and has united with the blood. We already learned that all acids, cyanic acid excepted, cause a decomposition of the blood, and its product is hæmatine.

Now let us logically apply all these ascertained facts to our case in hand, in order to learn how this gas produces its effects upon the economy.

It deprives the blood of its oxygen, and enters into a close combination with its crystallizable material; so bound, it disables this latter to absorb oxygen from the air, or to supply it to the oxidizable tissues of the economy.

In Preyer's experiments we have seen that the dogs, when permitted to inhale oxygen at the highest stage of the dyspnœa, they became rapidly as well as ever. Not so after the inhalation of nitrous oxide gas. A certain effect upon the blood has taken place, often unimportant and transient, at other times more permanent and grave, sufficient at times to endanger life itself. We have also seen that under favorable conditions hyponitric acid is formed, which causes a decomposition of the hæmato-crystalline into hæmatine, a substance which is not capable of sustaining life. Thus we are forced to acknowledge that the application of this gas is far from being safe and harmless; that on the contrary it is pregnant with grave consequences.

"These facts," says a writer in Braithwaite's Retrospect, No. 67, July 1873, "ruthlessly destroy the infatuation, that the inhalation of nitrous oxide gas is a harmless process, a process which any man, educated or not educated, may carry on without danger of destroying life. The recent death which has occurred at Exeter on the afternoon of January 22d

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of this year furnishes a lesson not to be forgotten. The gas was administered by Dr. F. F. Mason, for the purpose of the painless extraction of a large, upper molar tooth. The lady, Miss Wyndham, was about 38 years of age, in good health. Her physician, Dr. Pattison, was present. Gas from the same source had been administered to other patients, so that its quality could not be impugned. She took the gas in the usual way, without any symptoms to excite uneasiness. At the proper degree of insensibility the gas was stopped and the tooth extracted. It was not until after the operation was completed that anything unusual happened; her face suddenly became livid, and the features began to swell, and she seemed to be quite unconscious. She breathed two or three times, and in a few moments her pulse ceased to beat. All attempts to restore her were fruitless.

"There was no obstruction to the air passages, and the tongue was protruded while she still respired."

The writer continues: "From no agent have there been so many hairbreadth escapes from death as from this gas, and probably of late some persons every day have been brought within the minutest line of danger to which Miss Wyndham succumbed.

"We learn the most important lesson, that we have a great deal to learn before we shall have perfected anæsthetic agents. Toward such learning the re-introduction of nitrous oxide gas has been a serious check.

"Nitrous oxide gas is indeed not a true anæsthetic at all. A true anæsthetic is an agent that suspends common sensibility without by any necessity interfering with those organic processes on the continuance of which life depends. Nitrous oxide gas acts by suspending one of the most important of the organic processes, that of respiration. The insensibility produced by this gas is afforded during an interval of partial death. This interval, doubtful, transient, dangerous, may allow an operator time for a short operation, and suspending the inhalation the function may return; but that it may never return the above case furnishes a lamentable proof."

This was written in 1873, and many other cases of death from this gas are since recorded. Two years previous to this, in 1871, my warnings had reached England, and had in part been published there in the *Medical Times and Gazette*, London, January 13th, 1872. It was a lecture delivered before the New York Academy of Medicine in 1871. Touching nitrous oxide gas I made the following remarks: "No intelligent observer who ever witnessed the ghastly, cyanosed appearance of persons who have inhaled this gas until its anæsthetic effects are produced, will deny that the ensemble of symptoms betokens a powerful influence upon the blood mass which

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continues for many hours and days. I have seen some cases where the inhalation of this gas was followed by pulmonary and cardiac disease and death. The profession at large may yet learn to modify its opinion regarding its freedom from danger after its application."

You may remind me that in the dental institution in New York we are shown a gigantic roll containing the names of many thousands who have inhaled this gas there, so far, without any direct fatal effect.

But how is it with after effects? The institution referred to keeps no record of what becomes of its patients afterwards. One of my fatal cases—dying from after effects—had inhaled the gas there three or four months previous. She was a perfectly healthy woman before the inhalation, and her disease began right after it. Other well authenticated cases are not wanting to prove that nervous disorders of many kinds, and a train of organic diseases, follow its exhibition. Dr. Frank Hamilton of New York attended a case of incurable epilepsy directly produced by the inhalation of the gas. Dr. F. R. Thomas, in his treatise on "Nitrous Oxide Gas," says: "It resembles strongly in its effect an attack of congestive apoplexy. Many are deprived of sleep long afterwards, and complain of unremitting headaches; nor are instances rare where after its use vertigo, syncope, melancholy, insomnia, convulsions, hysteria and irregular heart's action could be attributed directly to its use." (Dr. George J. Ziegler's researches on nitrous oxide.)

Having fully pointed out to you the manner in which nitrous oxide gas affects the blood, it must serve you as a type for all those agents which deprive the blood of its oxygen, and form stable crystalline compounds with the hæmato-crystalline, whereby its life function is gravely impaired, and under certain conditions forever lost.

In case of accident with nitrous oxide our indications are confined to narrow limits. We must try to economise the still intact blood corpuscles, and by transfusion, and especially by artificial respiration, to favor a full and long supply of oxygen to sustain the little flame of life. Electricity may be used to keep up the muscular action of the heart and lungs. We may thus succeed to ozonize the accumulated nitrous oxide, and to eliminate it from the system. Porowsky has thus succeeded in some almost hopeless cases of poisoning with carbonic oxide, and the procedure seems to me well adapted also in cases of poisoning with nitrous oxide gas.

The next class affects the blood by causing a mechanical breaking up of the blood corpuscles, or a true chemolysis of blood element. This class, says Hoppe Seyler, does not affect the function of the hæmato-crystalline, but prevents oxygenation and oxidation in the tissues.

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Chloroform.

The introduction of chloroform into the blood current is noted for its energy and corresponding danger. Experiments made with this agent upon the blood show that the hæmato-crystalline is precipitated from its solution; a gelatinous mass is formed, leaving a ghost of a stroma in the shape of empty cell walls.

Preyer says that "the spectrum of the precipitated hæmato-crystalline is normal, and the two bands between D and E are clearly seen. The force of chloroform is therefore not spent upon the hæmato-crystalline, and the mischief done must be sought in the results of a cleavage in which the hæmato-crystalline is forcibly expelled from and exudes from the blood corpuscle. It is probable also that it is thus forcibly separated from its potassa carbonate. In a fatal case of chloroform inhalation reported in the *New York Medical Record*, Sept. 1st, 1877, postmortem examination revealed that the immediate cause of death was found to be effusion of blood upon the brain. It will be seen that the foregoing view tallies with this pathological condition. Chloroform forms no combination with the blood in the manner nitrous oxide acid and other chemical agents of like nature do.

Chloroform possesses another characteristic that adds to its fatal influence when inhaled; it is its high boiling point, requiring a great amount of vital force, a great amount of oxygen to ozonize it and to eliminate it from the economy. It is a well ascertained fact that in all anæsthetic agents the boiling point of each is of the highest consequence. The higher the boiling point, the greater the probability of danger. Prof. Silliman says: "The main disadvantage of chloroform is its high boiling point, requiring a great amount of vital force to eliminate it from the body, so that it is probably never eliminated entirely by the lungs, but only with the aid of all excreting organs, any deficiency or derangement of which may consequently lead to such suppression of elimination that the nervous system may be overwhelmed with consequent arrest of their activity." (Silliman's Lecture, 1871.)

It is but fair to state that here also is a great deal to learn of the mode in which chloroform spends its force in the living economy. The warning given when I spoke of nitrous oxide gas, regarding the danger to give this agent to debilitated persons, or to those laboring under organic disease, and in impoverished conditions of the blood, must find a still more grave consideration here. How the extravasated hæmato-crystalline is carried out of the system is a matter of surmise. I found very frequently sugar in the urine after the inhalation of chloroform.

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Prof. Silliman thinks the best treatment in impending death from chloroform is the introduction of air into the lungs by artificial respiration—heated to 130° F.—by means of bellows.

Ether.

The action of ether is somewhat different. You remember that in speaking of the blood corpuscles I mentioned protagon and cholesterine among its constituents. Protagon is a saponified phosphor-oleate, and according to Dickenson and Stricker an emulsion of cerebic acid and lecethin. Albumen, protagon and cholesterine form the medullary part of the nerves, and their great importance to the animal economy is conceded on all hands. They are found stored up in animals as well as plants, and support all vital processes of germination and growth.

Formerly indeed their presence was not considered of very great importance. It was thought these substances had only a subordinate function to perform. We know now that they furnish elements for the brain, and are ever present in the primitive vital elements of the seminal fluids, the yolk of eggs, and in the red as well as white blood cells. Ether dissolves these important factors out of the blood, as well as out of vegetable seeds, such as peas, beans and lentils. It breaks up the determined constitution of the blood cells, and thus affects directly the hæmato-crystalline by severing its association with potassa carbonate.

When ether is shaken up with fresh blood a gelatinous mass is formed; the bright cherry red is changed into a muddy, brown-colored pigment. When this change is observed by means of a gas chamber, such as used by Stricker and Lancaster, and the spectroscope, we find that in addition to the oxyhæmato-crystalline band between D and E, there appears a third band near C in the red part of the spectrum. (See Preyer, Die Blutcrystalle, p. 146.) The band in red always denotes that grave changes have befallen the blood, and Hoppe Seyler thinks it is due to the formation of methæmoglobin.

Fortunately for suffering humanity the boiling point of ether is far below that of chloroform, and less oxygen is needed for its elimination from the system. Yet ether has also its death-roll, like chloroform and other agents, less appalling, it is true, but still all caution is necessary and eternal watchfulness and care.

And now the end has come, undoubtedly to your great comfort and relief. I thank you for your undivided attention during the delivery of my remarks. I hope they may stimulate thought and original investigation, and give encouragement to unceasing efforts, until the great boon to humanity, "a perfect anæsthetic," is found.

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Dr. Caldwell made a short address on the application of the spectroscope to the discovery of the character of tumors inaccessible to direct observation.

A motion was adopted by the United Meeting tendering a vote of thanks to the Baltimore & Ohio Railroad Company for its kind offer to place at our disposal on any day we might name, a train for an excursion to view the magnificent scenery of Cheat River; but it was informally decided that in view of the large amount of important business still to come before us, it was impossible to name a day for that purpose.

The United Meeting then adjourned.

Afternoon Session, Third Day.

The United Meeting assembled at 4 o'clock P. M.

The papers of the morning session were discussed by Drs. Caldwell, Waterman, Winder, Odell, Taft, Atkinson, Evans of Baltimore, Coy, King, Templeton, and Walker.

Upon the conclusion of the discussion, a vote of thanks was tendered to Dr. Waterman for his interesting and instructive lecture.

On motion, the United Meeting adjourned.

Oakland, *August 17th*, 1877.

There was no clinic this morning.

Morning Session, Fourth Day.

The United Meeting was called to order at 10 o'clock A. M., Drs. Atkinson, Ford, and Coy presiding.

The minutes of yesterday's sessions were read and approved.

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Dr. Donaldson, Chairman of the Education Committee of the Md. and D. C. Association, stated that the other two members of that Committee were absent, and Dr. Coy, President, filled their places temporarily by the appointment of Dr. E. P. Keech, of Baltimore, and Dr. J. Curtiss Smithe, of Washington.

A letter was read from Dr. G. A. Mills to the Secretary of the Md. and D. C. Association, requesting that "his name be dropped from the list of active members of that Association, as he had removed to Brooklyn, N. Y., and was therefore ineligible."

The request of Dr. Mills was complied with.

Letters were read from Dr. H. Townsend, of Philadelphia, and Dr. J. G. Ambler, of New York, regretting their inability to be present, the latter submitting a statement showing a balance of $48 in his favor as Treasurer of the American Dental Convention.

Dr. E. P. Keech, from the Committee on Pathology of the Md. and D. C. Association, read a paper on that subject. This paper has been lost.

The paper was discussed by Drs. Coy, Taft, Odell, Ford and Walker.

Dr. Caldwell read a paper on the Involuntary Action of the Nervous System. (This paper has been withheld by Dr. Caldwell from the Publication Committee.)

On motion, the Treasurer of the United Bodies was authorized to pay bills presented.

The President here stated that a telegram had been received from Dr. Hunt (who was suddenly summoned yesterday to return to Washington) announcing that Mrs. Hunt died this morning a few hours before he reached home.

A motion was adopted that a committee of three be appointed to draft resolutions of sympathy for Dr. Hunt in his affliction. The President appointed Drs. Donaldson, Coy and Hills.

The committee, after consultation, reported the following resolutions:

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Resolved, That this United Meeting has heard with deep regret of the loss sustained by our esteemed friend and brother Dr. R. Finley Hunt, in the sudden death of his beloved wife, which occurred at an early hour this morning, and which called him from us before the completion of the labors of our present meeting, to a home rendered desolate by this unexpected dispensation of Divine Providence.

Resolved, that we tender to our beloved brother and his afflicted family the assurance of our heartfelt sympathy in their bereavement.

The resolutions were adopted.

On motion, the United Meeting adjourned.

Afternoon Session, Fourth Day.

The United Meeting was called to order at 4 o'clock P. M.

On motion of Dr. Ford, it was resolved that a joint publication committee of three be appointed to prepare current proceedings for the printer, and Dr. Donaldson for the A. D. C., Dr. Winder for the S. D. A., and Dr. J. C. Smithe for the Md. & D. C. A., were selected by the Chair for that committee.

The Education Committee of the Md. & D. C. A., through its chairman, Dr. Donaldson, reported that they had selected H. M. Schooley, of the District of Columbia, for the free scholarship in the Maryland Dental College, and their selection was confirmed.

On motion of Dr. Donaldson, the time of each speaker in the discussions was limited to five minutes.

At this point Dr. Davidson, of London, England, stated that he had some articles with him that he would like to show, and the Meeting took a recess to see them, when he exhibited a new articulator, and interesting specimens of artificial dentures, some of them made one hundred years ago.

On motion, the subject of Pathology was passed, and that of Operative Dentistry taken up.

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DR. PALMER —

There is a point in reference to the cases of which I showed you models yesterday, that I would like to say a word about. In fact, it applies to all cavities where the dentine is very sensitive. That is, the use of the hot-air blower and carbolic acid, or creasote. In connection with that I recommend the use of a very fine burnishing instrument, so fine that it will reach any part of the cavity you may be filling. In those cases where the pulp chamber approaches so near the centre, and each wing comes so close that there is scarcely any covering left, the last thing I do before bringing the gold in contact with it is to give it a coating of carbolic acid, and direct my blast of hot air against it and reduce it to a dry state. I think that a very nice point. I do think that the use of the hot-air blower is indispensable in sensitive cavities.

There is something I would like to say to you in reference to the covering up of pulps. Let the carbolic acid flow in upon the pulp so as not to press upon it, but come in contact with it. In placing oxychloride over this, it may be done very nicely by just putting in a little of the powder and then place upon it the liquid. In that manner the pulp may be covered, and when it is complete there is no chamber left, and anything that comes short of doing this I think is imperfect.

DR. COY —

Yes, Mr. President, this looks very nice in theory. This space is supposed to be supplied with something to take the place of, and yet preserve the vitality of, the pulp. Some gentlemen live in different localities from what I do, and I presume they are able to preserve pulps under such circumstances. If you take off a part of the ganglionic nerve, which the pulp is composed of, and attempt to supply that with anything that you may substitute, you have failed to supply what our Maker put there, and death will ensue.

DR. ATKINSON —

If there was nobody present but Dr. Coy, I should refrain from making any remarks. But he has asserted that which I regard an impossibility. It is all hallucination for a man to talk in that way. Any perfect pulp can be cut off within any part of the branches and the tooth remain alive. If the Doctor's experience is as he says, then his explanation has something to do with it. But I believe the restoration of the pulp, if treated properly, will result in success wherever you are. Take the creamy oxychloride of zinc and flow it over

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the pulp, and hold it there until it sets, and then you have the best possible results by the law of crystallization.

DR. ODELL —

Do you bring your oxychloride in contact with the point of exposure?

DR. ATKINSON —

The oxychloride, if you will mix it up in a thin paste and lay it on there, will flow over.

DR. COY —

The gentleman seems to be somewhat enthusiastic on this subject. I do not really think Dr. Atkinson means what he says. We have sufficient evidence to know that the nerve in a tooth is a terminal one. It doesn't matter which extremity you take, you find that same sensibility that you find in a tooth. This nerve seems to have control over the vessels that come in there. Now, in an operation upon this nerve, a portion of it is cut off, and you expect a healing over. I never have seen it.

DR. WALKER —

As long ago as probably 1845 or '50, I was in the habit of putting a layer of gold next the labial walls of a cavity and putting tin foil against it. The reason I did this was that I had a class of patients who were not able to pay much for my services. Notwithstanding all that has been said against that practice, I have never seen any galvanic action when the work was properly done.

The subject of Operative Dentistry was then passed.

On motion, the subject of Diagnosis and Therapeutics was passed without discussion; also that of Chemistry of the Metals and Metallurgy.

Under Artificial Dentistry, Dr. Atkinson read a letter from Dr. C. A. Marvin, regretting that on account of the illness of his wife, he was unable to be present, as he had intended to be, with a paper on "The Relations of Physiology to Mechanical Dentistry."

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DR. COY —

The subject of restoring the expression with the means we have at hand in mechanical dentistry, should receive more attention than it gets.

DR. FORD —

There was one little remark in that letter of Dr. Marvin, advocating the relation between operative and mechanical dentistry. When we were doing almost exclusively metal work, it took a good deal of ingenuity to run the mechanical department; but since these other bases have come in, it can be done, and is done, without a first-class man being engaged in it. Now, I think the two ought to be severed. It would not hurt the mechanical department, but would tend to elevate it. I am an advocate for the severing of the two most decidedly.

DR. COY —

This subject has been brought upon us without a paper, but there are some points that have been touched upon that should not be passed. No man is successful in artificial dentures unless he is qualified to operate in the mouth. I do not agree with my friend in severing the two. I saw a set of teeth coming from a man who claimed to be one of the best mechanical dentists in the United States. The lady had gray hair, and he put blue teeth in her mouth. How would blue teeth look in the gaslight at night? You employ a mere mechanic to set up these teeth, and he will set up one kind as soon as he will another. I dislike it very much, and confess to not putting my hands in the plaster barrel. I select the teeth and put them in, and my patients are willing to pay more than five dollars for them. I propose to do the brain work and hire some one to do the rough work. It is a part of operative dentistry, and no man can be successful in artificial dentures unless he is a successful operator in the mouth.

On motion, the subject of Artificial Dentistry was passed.

Dental Education and Dental Literature was then taken up.

Under this head, Dr. Atkinson made a few remarks, comparing the facilities of to-day for obtaining a dental education with those of forty or fifty years ago. He said, "All honor to the name of Chapin A. Harris."

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Dr. Bartlett, resident physician of Oakland, was invited to say something on this subject.

DR. BARTLETT —

I am not prepared to discuss this question or any other connected with dental education. I was surprised in listening to the papers I have heard read here. I had no idea that the dentists of this or any other country were going down to the scientific principles that they are. I feel that we, the members of the dental profession and the members of the medical profession, are going hand in hand together. Our aim is the same. Embryology: there is where we both begin, and there is where we both reach as near to perfection as we can. I am not prepared to discuss the question of dental education and the qualifications necessary for a dentist. We should try to make more perfect that which should be perfection. In our profession, those who were my pupils twenty years ago fought through the same rugged paths that the dental profession has gone through with.

DR. COY —

This is a subject that ought not to be passed over by this meeting without some papers and discussion. It is a matter that lies at the very foundation of dentistry. And do we expect our young men, who are coming up to take our places, to be properly educated unless we take more interest in this subject than we have taken at this meeting? We have had no paper on the subject and no particular discussion has been drawn out. At the present day it is necessary for the dental student to be qualified in all the branches that the medical student is qualified in. There are only a few medical men that are required to dive so deep. It is required in the dental profession that their education should go from embryology up. Being an instructor in a dental college, I am of course deeply interested. A dental college should make thinking men. The object of this meeting and the papers that have been read here is to set men to thinking.

DR. WALKER —

It has been very properly said that dental education has drawn us together in this body. Much good has been done, but much more might have been done if we had understood thoroughly the benefit of a better organization. Dr. Coy has well said that we have seen some benefits from having our work divided up in sections. In this way we put men in a place where they will work to the best advantage.

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The Meeting then took a recess until 8.45 P. M.

The United Meeting resumed its session at 8.45.

Dr. J. Curtiss Smithe presented the following report from the special Committee on Dental Instruments and Appliances:

The Committee on Dental Appliances have the honor to report that they have made an examination of various instruments and appliances presented by inventors and manufacturers. Owing to the limited time between the sessions, they cannot enter into a very minute description of the many articles which are well worthy of an extended notice.

S. S. White, of Philadelphia, and Johnston Bros., of New York, presented to the notice of the Committee improvements in operating chairs which possess great value, and which seem to leave little room for further improvement in that direction. The admirable chair of S. S. White you are all familiar with, and as there has been no improvement of late except the locking device for holding the spittoon, it is not necessary to enter into a description of it.

The chair presented by Johnston Bros., the invention of Dr. Wilkerson of Baltimore, has many new features, in raising the chair with ease and changing its position while operating, which commend it to the profession as second to none. In justice it merits a full description, but want of time forbids.

Of burring engines S. S. White has but one new device, and that is a sleeve in the hand-piece to prevent its being disengaged while in use—a decided improvement over the old form.

Johnston Bros. present a new engine. Its special points are: 1st, a single pulley on the shaft rotating in a bearing about one-half the length of the driving-rod, insuring steadiness of motion; 2d, a standard mounted on flexible steel springs, giving it a springing motion without the aid of a balance spring; 3d, a spring treadle—the spring is placed under the treadle, giving to the pitman a reciprocating movement. It also acts as an off-centre spring in connection with a wheel made lighter on one side than on the other. They also presented a new hand-piece, intended to be adapted to any engine. Your Committee consider that this possesses many new and valuable features which will, they believe, recommend it to the profession, as they have overcome the defects so often complained of in the old forms, particularly that of wearing so as to give an irregular movement to the instruments. With it, they have also brought out a right angle hand-piece, which possesses many valuable features in retaining the point, &c. That commends it. Johnston & Selby presented Rhett's motor. This is a motor having four springs attached to the main shaft in such a manner as to neutralize the strain on the

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shaft. It quadruples the power in the same space that would be occupied by one spring. The springs are also so arranged that each spring bears equally on the driving wheel. In the opinion of the Committee it will need improving before it will be available for dentists' use.

The following articles were presented by Johnston & Selby: Dr. W. S. Elliott's cheek distender, intended to keep the cheek and also the rubber dam out of the way of the operator; Dr. St. George Elliott's amalgam carrier, intended to convey the amalgam to the cavity without trouble or waste; an improved valve for holding gas under heavy pressure; Palmer's clamps, a new full set for all forms of teeth, embracing 32. The design is to have a special clamp for each form of tooth. The work has been done with great care by Dr. Delos Palmer of New York. Also Clapp's saw frame and saws, a neat and convenient device for separating for approximal fillings by passing between crowded teeth before applying the rubber dam, &c. Morrison's instruments for using gold retaining screws; the design is to simplify the operation by using a holder containing a gold rod with a thread cut through its entire length.

In automatic mallets, a new mallet operated by the thumb or forefinger, a very ingenious device giving a blow very nearly resembling that of a hand-mallet; presented by Dr. King, of Pittsburgh, Pa.

Dr. Donaldson, of Washington, presents a mallet operated by the burring engine, which seems to operate well — better than any mallet heretofore operated by an engine, and merits a more extended notice than the committee can give it. It will shortly be placed on the market, and we believe it will be found a very useful instrument in the hands of those who desire an engine mallet.

Dr. Davidson, of London, England, presented some specimens of artificial work, some of the cases having been made one hundred years ago: an articulating frame, a gas blowpipe, and combined hard and soft rubber wedges for supporting or keeping the mouth open during operations with gas or in filling.

This crude and hasty report we submit to the meeting, regretting that we could not have time to give a more full description of the many instruments and appliances submitted to our examination.

J. Curtiss Smithe,
J. R. Walker,
J. Taft,
Committee.

The report was, on motion, adopted.

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The following resolutions were unanimously adopted:

Resolved, That the thanks of the members of the United Meeting of the American Dental Convention, the Southern Dental Association, and the Maryland and District of Columbia Dental Association, are due and are hereby tendered to the B. & O. R. R. and such of the connecting railroads as extended to them excursion tickets; to the former also for the free use of a freight car for the transportation of chairs and other appliances.

To the proprietors of the Oakland Hotel and the citizens of Oakland for their kindness and hospitality, especially to the members of the Presbyterian congregation for the use of their handsome and commodious church edifice wherein to hold their sessions.

To Rev. Dr. Bacon for his ministerial services at the opening of the sessions.

To Dr. J. L. McComas for the kind proffer of his office for clinics; and

To Mr. J. W. Selby for his efficient aid in preparing for and conducting the clinics.

Resolved, That these resolutions be published in each of the papers issued in this county.

The following report of the Executive Committee was read and adopted:

Current expenses of United Meeting at Oakland, August 1877, as follows:

Printing circulars of invitation	$18 00
Postage stamps	8 00
Stationery	4 48
Printing programmes and billheads	10 50
Rent of hall for clinics	10 00
Janitor and incidentals	8 25
Reporter, H. M. Schooley	25 00
Total	$84 23

T. S. WATERS,
H. B. NOBLE,
Executive Committee.

On motion, the American Dental Convention proceeded to the election of its officers for the ensuing year, with the following result:

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President:	Dr. J. Taft, of Cincinnati, O.
Vice-President:	Dr. J. R. Walker, of New Orleans, La.
Secretary:	Dr. Ambler Tees, of Philadelphia, Pa.
Treasurer:	Dr. J. G. Ambler, of New York, N. Y.

The Publication Committee was retained.

The Convention decided to hold its next annual meeting at Niagara Falls, on the first Tuesday in August, 1878.

A motion was adopted that a committee of ten be appointed to confer with the committee of ten of the American Dental Association, and a similar committee, if appointed, from the Southern Dental Association, with a view to the formation of a National Representative Dental Association, and the President, Dr. Atkinson, appointed on that committee Drs. R. B. Winder, of Baltimore; A. L. Northrop and John Allen, of New York; B. F. Coy, of Baltimore; J. Taft, of Cincinnati; C. E. Kells, of New Orleans; R. B. Donaldson and H. B. Noble, of Washington; C. King, of Pittsburgh; and C. F. Vandenburg, of ———

The Publication Committee of the Md. and D. C. Association made the following report, which was approved:

The Committee on Publication respectfully report that the proceedings of the last meeting, held in Baltimore, September 6, 7 and 8, 1876, have been printed at a cost of $105.36 for two hundred copies. Of these there have been sold copies to the amount of $15, thus reducing the cost to the Association to $90.36. One hundred and forty copies distributed to members and others, leaving on hand sixty (60) copies.

H. C. Thompson,
J. Curtiss Smithe,
F. F. Drew.

The Executive Committee of the same association made their regular report as follows:

Your Executive Committee, in connection with the Executive Committee of the American Dental Convention and Committee of Arrangements of the Southern Dental Association, made preparations for this meeting by having printed 2000 circulars of invitation, which were sent to all the members of the three bodies, as well as to many others whom it was

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desired to have present. They also entered into correspondence with railroad lines leading from all parts of the country to Oakland. The Baltimore and Ohio Railroad responded promptly and liberally by offering over their own road excursion tickets at one fare and free transportation to and from Oakland for all freight required for the purposes of the meeting; also to aid the committees in negotiations with other lines. These negotiations resulted satisfactorily in the case of roads immediately connecting with the Baltimore and Ohio Railroad. In other instances there was great tardiness and apparent blindness to the opportunity of inducing travel where there would otherwise have been no travel, and of re-establishing the habit of travel where that habit had been dropped. This was notably the case with Southern and Southwestern lines. This tardiness, combined with the railroad disturbances in this section of the country, has prevented the large attendance that was desired and anticipated; but notwithstanding all this it has been a satisfactory and eminently fraternal meeting.

In reporting on the finances of our Association, your Committee must necessarily include the receipts and expenditures of this United Meeting, as the Presidents of the A. D. Convention and the S. D. Association directed that their receipts should be covered into our treasury. (See Treasurer's Report.)

The Treasurer's report, which we audited and found correct, is herewith submitted with his vouchers.

Amount received during the year.....	$296 63
Amount paid out during the year.....	224 43
Balance in treasury.....	$ 72 20
Now due from members and unpaid, about....	$150 00

T. S. Waters,
H. B. Noble,
M. W. Foster.

On motion of Dr. Waters, an assessment of two dollars was made on the members of the Md. and D. C. Association.

That body then, after determining to hold its next annual meeting at Washington, D. C., on the second Tuesday in October, 1878, proceeded to the election of officers for the ensuing year, with the following result:

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President: Dr. B. F. Coy, of Baltimore, Md.
Vice-President: Dr. J. Curtiss Smithe, of Washington, D. C.
Rec. Secretary: Dr. M. W. Foster, of Baltimore, Md.
Rep. Secretary: Dr. F. F. Drew, of Baltimore, Md.
Treasurer: Dr. H. B. Noble, of Washington, D. C.

Executive Committee:

Dr. J. B. Ten Eyck, Washington.
Dr. E. P. Keech, Baltimore.
Dr. W. W. Evans, Washington.

The President elect, on being conducted to his chair by Drs. Donaldson and Waters, said:

Gentlemen, I hope that the only time I shall disappoint you during my term of office will be now in respect to a speech. I have had too much on my mind in the last few days to prepare one, even if I had expected this honor. However, I feel the importance of the position, and will but say that if I can only serve you as well as the President of the last year, I will feel that I shall have done ample justice to the position. I shall work for the interest, as I always have done, of the Association. With these few remarks, consider me at your service for the next year.

Dr. Smithe, the Vice-President elect, on taking his chair, said:

Gentlemen, I am not a speech-maker. I thank you very kindly for the honor conferred on me this evening, and can only say that I will try to do my duty well.

The three organizations forming this United Meeting then adjourned *sine die.*

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Thirty-ninth Annual Session--1878-79.

THE OLDEST DENTAL COLLEGE IN THE WORLD.

FERDINAND J. S. GORGAS, A. M., M. D., D. D. S., Prof. of Dental Surgery and Therapeutics.
E. LLOYD HOWARD. A. M. M. D., Professor of Chemistry.
JAMES H. HARRIS, M. D., D. D. S., Professor of Clinical Dentistry.
JAMES B. HODGKIN D. D. S., Professor of Dental Mechanism and Metallurgy.
THOMAS S. LATIMER, M. D., Professor of Anatomy and Physiology.
B. M. WILKERSON, M. D., D. D. S., Demonstrator of Operative Dentistry.
JOHN C. UHLER, M. D., D. D. S., Demonstrator of Mechanical Dentistry.
AUGUSTUS W. SWEENEY, D. D. S., Assistant Demonstrator.
LUKE J. PEARCE, D. D. S., Assistant Demonstrator.
CHARLES F. BEVAN, M. D., Demonstrator of Anatomy.

The 39th Course of Instruction will commence on TUESDAY, OCTOBER 15th, 1878, and continue until the beginning of March following. The first weeks of the Session are devoted to Lectures on practical subjects, especially the "Filling of Teeth," and construction of Artificial Teeth, Clinics, Infirmary Practice and Demonstrations.

Graduates of the Baltimore College of Dental Surgery are required to attend but *one session* in several of the Medical Colleges of Baltimore.

For information address

F. J. S. GORGAS, Dean,

No. 259 North Eutaw Street, Baltimore, Md,

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Maryland Dental College,

OF BALTIMORE CITY.

ANNUAL SESSION 1878-'79.

FACULTY.

SAMUEL H. WILLIAMS, D. D. S.,
Emeritus Professor of the Institute of Dentistry.
R. B. DONALDSON, D. D. S., Professor of Dental Surgery.
E. P. KEECH, M. D., D. D. S., Professor of Pathology and Therapeutics.
M. WHILLDIN FOSTER, M. D., D. D. S.,
Professor of Dental Mechanism and Metallurgy.
RICHARD B. WINDER, M. D, D. D. S.,
Professor of Physiology and Materia Medica.
R. FINLEY HUNT, D. D. S., Professor of Chemistry and Physics.
BOLLING W. BARTON, M. D., Professor of Anatomy.
C. T. BROCKETT, M. D. D. D. S, Demonstrator in charge of Infirmary.
H. G. ULRICH, D. D. S., Demonstrator of Practical Dentistry.
T. MORRIS MURRAY, M. D., Demonstrator of Anatomy.

The sixth annual session of the Maryland Dental College will commence October 1st, 1878, and continue until March, 1879. Clinical lectures only will be delivered during the first month; the regular course commencing November 1st.

MATRICULATION, TUITION, &C.—Students before matriculating will be required to pass a satisfactory examination in the usual branches which constitute a good English education, and they will also be required to furnish evidence of their good moral character and personal standing.

By the advice of the Board of Regents, this School has adopted the same system as the University of Virginia, the Johns Hopkins University, and other like institutions, which confer their diplomas whenever merited; consequently, any matriculant who is twenty-one years of age and of good standing in his class, will have the privilege at the close of the session of coming forward as a candidate for graduation.

Graduates of this college will be received as second course students at the medical school of Physicians and Surgeons.

For further particulars apply to

R. B. WINDER, Dean of the Faculty,

No. 140 Park Avenue, Baltimore, Md.

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JOHNSTON BROS., J. W. SELBY.
No. 1260 Broadway, New York.

JOHNSTON BROS. & SELBY,

DENTAL DEPOT,

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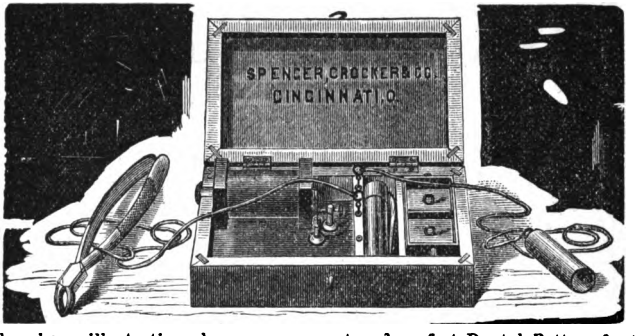
The "Best" Dental Battery

FOR USE IN

THE EXTRACTION OF TEETH.



The above illustration shows a very neat and perfect Dental Battery for "extracting teeth without pain," which we have just completed for the dental trade. It runs alone. No crank to turn. No jars of solution to slop over and make a muss.

DIRECTIONS FOR RUNNING BATTERY.

To charge the battery, take off the movable plates of zinc, and place in each portion of the trough as much of the Sulphate of Mercury as will lie on a silver half dollar. Then put in a sufficient quantity of water to come up to the under surface of the zincs, and replace the zincs in the trough.

To start the machine, adjust the platinum-pointed screw to the circuit-breaker spring until the hammer vibrates with regularity under the action of the battery current.

The slot in the top of the trough should always be on the same side as the letter S, which will be seen on the box. Otherwise the direction of the current will be reversed.

The cord which is connected with the hole nearest P is the positive, and the one in the hole nearest N, is the negative terminal of the secondary coil, when the battery has been arranged as described above.

If the zincs are taken out and the solution stirred once in every ten or fifteen minutes, the strength of the current will be increased.

The sitting being ended, DO NOT PUT AWAY THE BATTERY WITHOUT HAVING EMPTIED AND WASHED THE TROUGH, which may then be replaced without injury to its proper place.

DIRECTIONS FOR USE IN EXTRACTION.

Select the forceps desired for the case. Slip the loop in end of conductor over the handle of forceps as shown in cut; see that this conductor is connected with negative pole of battery; then have the brass handle connected with positive pole, and put within easy reach of patient; now apply forceps to tooth, being careful not to give pain; then tell patient to pick up handle, and at same time crowd forceps to its place and remove the tooth.

The current should be moderate, not strong enough to give pain, and must be regulated for each patient. Some will require much stronger current than others. It is well to give patient the forceps in one hand and handle in the other, and with regulating piston on the left, regulate current to suit their capacity before operating.

N. B.—The operator should wear a light glove on hand that holds the forceps.

Size of Walnut Case: 7¼ inches long, 4¼ inches wide, by 2 inches deep.

Our facilities for manufacture enable us to furnish this apparatus complete, including bottle of Sulphate of Mercury, at the very reasonable price of **$7.50.**

Trade supplied.

SPENCER & CROCKER,

Cincinnati, O.

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Medal and Diploma Awarded

AT PHILADELPHIA, 1876.

WM. VALLEAU, JR.

MANUFACTURER OF

CHEMICALLY PURE

SOFT AND COHESIVE

GOLD FOILS,

WHOLESALE AND RETAIL,

506 BROOME STREET,

NEW YORK.

ESTABLISHED 1849.

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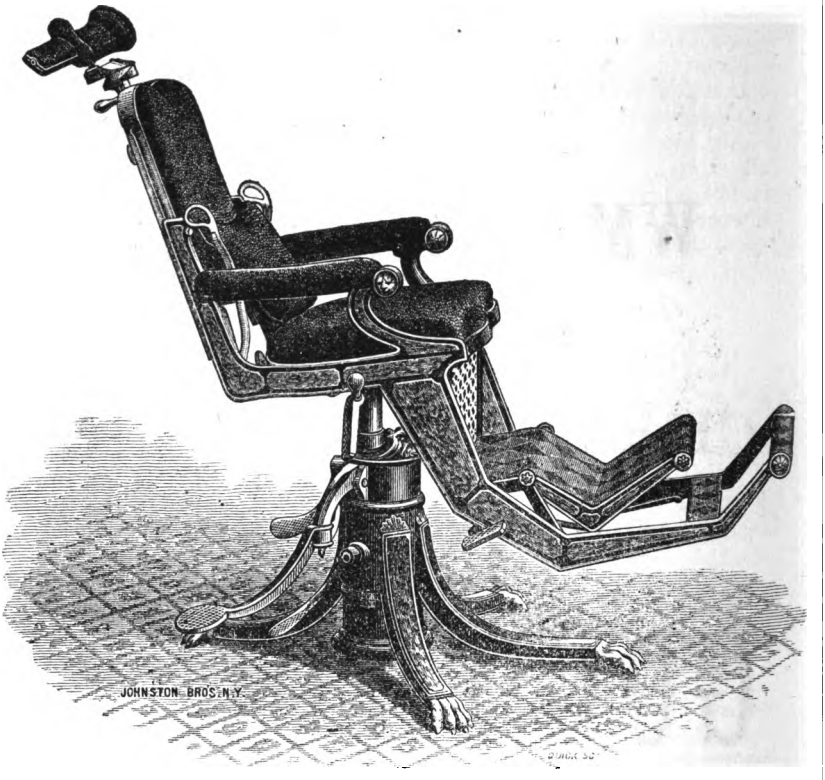
Wilkerson Dental Chair.

PATENTED NOV. 20, 1877.



PRICE, $175.

The cut is a good representation of this unique chair. The acknowledged requirements of a first-class dental chair have been here secured by Dr. M. B. Wilkerson—the inventor—by methods showing great originality. All cranks are dispensed with and levers substituted for them. The chair is raised by pressure of the foot on the long lever, which hides the back foot in the cut. This operation requires very little effort, and occupies but eight seconds, and is only equivalent to stepping up eight steps. To lower the chair one has only, with the toe of his boot, to raise the lever just back of that first named, and the chair sinks rapidly and noiselessly until the lever is dropped, when it instantly stops. Except when in use, the long lever folds in under the chair.

A touch of the lever in front of that just named leaves the chair free to rotate through the whole circle. Directly beneath the seat of the chair, and close to the seat, is shown a lever, which when pressed forward, permits the rocking movement while the lever is held, but whenever released, fastens the chair in position.

Thus the three principal movements, elevation, rocking and rotation, are accomplished. The minor movements, all of great importance, however, are the raising or lowering of the back of the chair; the raising in like manner of the head-rest; the slight rocking of the seat of the chair, so as to prevent the patient from sliding forward; the adjustment of the footstool at various lengths and heights; the spring back support to rest the small of the back. This at will is converted into a capital child's seat.

An arm-rest is shown at the right of the head-rest. It can be secured on either side of the head-rest at will.

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The whole chair is of the most substantial construction and highly ornamental. It will be upholstered in either green or garnet plush or in leather.

This is *not* an hydraulic chair. It has *no pump*, but is raised simply and solely by a lever actuated by the foot. When raised, the elevation of the central column, which supports the chair, tends to produce a vacuum in the chamber through which it passes, and this chamber is immediately filled by a column of oil, which, opening a valve at the bottom of the chamber and directly following up the central column of the chair, blocks it up whenever the lever ceases to raise it higher. Of course, whenever the same valve is tripped, the oil flows back into its receptacle, and the chair is rapidly and noiselessly lowered. *Not one drop of oil* has ever or can ever find egress from the inner base of the chair to its exterior. So much to silence constant misrepresentation of another dealer.

ADVANTAGES.

1st. It can be raised with the foot of the operator, and by a very slight effort.

2d. It can be raised in half the time of any other dental chair, except the Morrison.

3d. It can be lowered without exertion of force, and as much or as little, or as fast or as slow, as desired, by merely opening a valve.

4th. Its range of movement is superior.

5th. It has a perfect forward and backward movement, so that the patient can be rapidly inclined at any angle by a very slight exertion of force by the hand.

6th. Its arrangement for children is unique and excellent.

7th. Its footstool is readily adapted to the wants of large or small persons.

8th. Its head-rest is completely firm in any position in which it may be placed, has a large range, and is fastened by a single movement of the hand.

9th. The operator can control all its movements without once taking his hand from the mouth of the patient.

10th. It has a perfect rotary movement.

11th. By means of an adjustable foot it will stand firmly on any floor, however uneven.

We have orders for a large number, and are receiving more daily, and entering them in rotation.

JOHNSTON BROS., 1260 Broadway, N. Y.

JOHNSTON BROS. & SELBY, 23 N. Charles Street, Baltimore, Md.

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Wilkerson Dental Register,

FOR SALE

WHOLESALE AND RETAIL BY

JOHNSTON BROS. & SELBY,

23 North Charles Street,

BALTIMORE, MD.

We would quote Editorial Notice from "American Dental Journal":

"*Dental Register and Examination Book.*—By B. M. Wilkerson, D. D. S., M. D., Demonstrator of Operative Dentistry in the Baltimore College of Dental Surgery. Baltimore, 1876.

"As a Dental Register this new work presents as complete, convenient, and concise a system as it is possible to prepare; and dental practitioners will find it as simple as it is useful

"The plan, according to which it is arranged, requires the least practicable amount of time or labor in registering dental operations and delineating the condition of the oral cavity, thus meeting the requirements of the operator in such a manner as to give the greatest satisfaction.

"The diagrams, four in number on every page, are the special design of the author, and the most perfect for delineation which have yet been presented in a work of this kind. A book of this form containing 400 pages will register 1600 patients, whereas the ordinary Case Book requires one entire page for each patient.

"This new Register is also arranged for conveniently representing the character of professional services for each member of a family, without regard to numbers, with as much facility as the appointments are entered in a 'pocket companion.' Blanks for name, residence, &c., opposite each cut, prevent the possibility of confounding patients. This new work is gotten up in a handsome form with index, and printed on excellent paper."

TRADE SUPPLIED AT LIBERAL DISCOUNT.

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BUFFALO DENTAL MANUFACTURING CO.

307 & 309 Main Street, BUFFALO, N. Y.

MANUFACTURERS OF AND DEALERS IN

DENTAL GOODS

WHOLESALE AND RETAIL.

Also Sole Manufacturers in the United States of

LABORATORY APPARATUS,

For Colleges, Academies and Chemists,

Desig'd and Pat'd by THOMAS FLETCHER, F. C. S., Warrington, Eng.

Consisting of Hot and Cold Blast Blow-pipes, Ingot Moulds, Blowing Apparatus, Gas Furnaces, with and without blast, &c.

PRICE LISTS FURNISHED ON APPLICATION.

SAMUEL LEWIS,

DEALER IN

DENTAL MATERIALS,

1221 PENNSYLVANIA AVENUE,

WASHINGTON, D. C.

BLAKE & CO.,

MANUFACTURERS OF

DENTAL INSTRUMENTS

OF EVERY DESCRIPTION,

WHOLESALE AND RETAIL,

212 CHESTER STREET,

PHILADELPHIA.

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SAMSON RUBBER.

TRADE MARK, No. 3788, REGISTERED JUNE 20TH, 1866.

MANUFACTURED BY

No. 444 First Street,

DENTAL RUBBERS.

PRICES:

SAMSON RUBBER

Per Pound, $3.50.

EUGENE DOHERTY,

Brooklyn, E. D., New York.

DENTAL RUBBERS.

No. 1 Rubber, per pound,		$2 75
No. 2	" "	2 75
Black	" "	2 50
Gutta Percha,	"	2 50

Warranted to be the strongest and most uniform Rubber manufactured; vulcanizes same as ordinary Rubber.

The Strongest, Toughest and Durable Rubber Manufactured.

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SAMSON RUBBER.

Under the above name I offer to the Dental profession a Rubber which for strength, lightness and durability excels any heretofore manufactured. And I also claim for this Rubber, by a new process to which the composition is subjected, that it improves the quality and prevents it to a great extent from being porous, it also prevents the composition from showing on the surface after the Rubber has been vulcanized and polished as is the case with other Rubbers.

This Rubber is made from the best of Para gum, carefully selected and purified, and manufactured by my new process, is thoroughly free from injurious substances; each pound contains on an average twenty sheets. It has three times the strength of ordinary Rubbers, it packs easily, and for lightness and fine finish it is guaranteed to be superior to any rubber in the market. I commend it to all who wish to use Rubber as a base for artificial Dentures.

EUGENE DOHERTY,

PRICE PER POUND, $3.50. *Sole Manufacturer.*

N. B.—A word in regard to vulcanizing. I find after twenty-five years experience in the working of both hard and soft Rubbers, that the great trouble is caused by the sudden changes of heat, after the mercury is up to its given point; now the greatest of care must be taken during the process of vulcanization. You should raise the heat gradually to the degree required, and be careful not to let it rise rapidly, nor above the given point at any time while vulcanizing, because it is the sudden change of heat which spoils the Rubber, and makes it porous, and causes very disagreeable tastes or smell to come from it. It would be well once in a while to try a small piece of Rubber in the vulcanizer to see if the thermometer is in perfect order; if the piece is tough and springy and very hard to break, then you have got about the right heat for it, but if the Rubber is brittle, or you notice any pores in it, then you may know that it is vulcanized too much.

In regard to vulcanizing the above Rubber, I would say that about one hour at 320° F. is sufficient, unless the plate is unusually thick, then a longer time at a lower heat will answer better.

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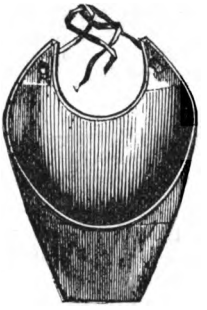

HORTON'S
WHITE RUBBER
DENTAL APRON OR BIB,
Designed and Patented, April 20, 1875, by R. HORTON, D. D. S.
Price reduced to $1.00, with or without Wire Frame.
SENT BY MAIL ON RECEIPT OF PRICE.
The above useful article is having a large sale and giving entire satisfaction, supplying
A Want long felt by many Operators.
Manufactured only by RANSOM & RANDOLPH.

TOOTH POWDER BOTTLE

DOUBLE METALLIC TOP

Tooth Powder Bottle.

New and Beautiful Pattern, made of best quality of glass, in three colors,

With Cork Joints,

Making them air tight. One pound of Powder fills a dozen bottles. Put up in boxes of half-dozen each,

FLINT, BLUE, AMBER,

$1.50 per doz.

RANSOM & RANDOLPH,

TOLEDO, O.

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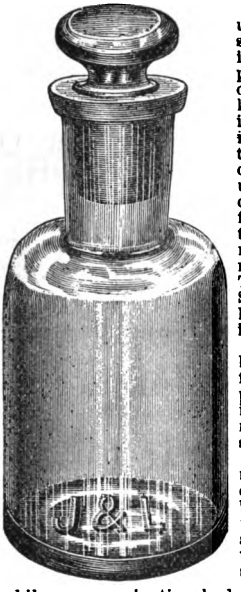
CRYSTALLINE CEMENT STOPPING.



The name of this *Cement*, unlike most others, has a significance In the mixing, a *chemical* union takes place between the atoms of the powder and the liquid, and produces during the process of hardening a complete crystallization, making a solid, compact mass, not merely uniting a few atoms chemically, and holding a few more mechanically together throughout the mass, as is the case in most other cements. THE CRYSTALLINE CEMENT STOPPING continues to harden after its insertion in the tooth.

This Cement owes its hardening quality to careful manipulation in preparing it, and not to ingredients that would render it soluble in the secretions in the mouth.

It is now put upon the market after a series of careful experiments made by our Mr. Oliver Lund, which have extended over a space of three years, and the result insures the strength of our claim,

while we conscientiously believe that the CRYSTALLINE CEMENT STOPPING is the *hardest*, *most durable* in the mouth, and the *best*, in *all practical respects*, that has ever yet been offered to the profession.

We have adoped a standard of color which is suitable to the majority of cases.

Put up in boxes containing one ounce and one-half ounce. Directions accompany each package.

N. B.—The glass stopper of the largest bottle is flat on top and fully one inch in diameter, making a very convenient tablet for mixing the material; and as the stopper is ground flat at the other end, it can be set out of the hand, if necessary, without toppling over.

A FEW REMARKS ABOUT CRYSTALLINE CEMENT STOPPING.

In our directions accompanying this article we say, "mix thoroughly" and "pack leisurely," and in these directions lie the secret of success in making a good filling with this cement. With nearly all other cements in the market it is necessary to join the powder and liquid quickly, and, in a half mixed condition rush it rapidly into the cavity, so as to get it in place before it begins to set, often making an imperfect filling. With the Crystalline Cement another course is to be pursued; and we would call particular attention to the following:

After the cavity is prepared and ready for filling, place one drop—or as small a quantity of the liquid as possible—on the glass, add the powder, small quantity at a time, and mix thoroughly, working it back and forth on the glass with a spatula or other suitable tool. It will now appear too moist: then add some more powder, and when it appears too dry at first, an energetic working will make it moist again. Work it in this manner until it assumes the condition of well-worked putty, neither too dry nor too moist, and then pack it *leisurely* into the cavity and cover it with a drop of collodion until it is entirely hard.

Now this thorough working brings every particle of the liquid in contact with the atoms of the powder and enables each to perform its part in the setting process, causing the whole mass to become as hard as stone, and finally to *crystallize*. This can be made apparent to any one who will mix a small quantity, as described above, and allow it to remain on the glass. Examine it next day with a magnifying glass; it will be found to be exceedingly hard, and of a dry chalk-like appearance. Allow it to stand for five or six days longer and examine again with the glass. It will be found that the dry chalky look has given place to a beautiful crystalline appearance, resembling a very fine marble, and as hard as adamant. It is this quality of allowing the operator *time* to mix the cement in a proper manner, and pack it as carefully as he would amalgam, that assists in making it so *superior* as a *cement filling*.

Price, per ounce, $3.00; per half-ounce, $1.50.

JOHNSON & LUND, Sole Proprietors.

620 Race St., Philadelphia, Pa. **68 Adams St., Chicago, Ill.**

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LAWRENCE'S AMALGAM.

THE BEST AMALGAM KNOWN,

USED AND ENDORSED BY

The Dental Profession throughout the Civilized World.

MANUFACTURED ONLY BY

DR. AMBROSE LAWRENCE,

86 Chandler Street, BOSTON, MASS.

ESTABLISHED IN 1842.

SOLD AT ALL RESPECTABLE DENTAL DEPOTS.

UNITED STATES DENTAL DEPOT.

H. C. CORFIELD & CO.

MANUFACTURERS OF

PORCELAIN TEETH.

The Teeth manufactured by us are fully equal in every respect to any in the market.

We have several hundred moulds, and are thereby enabled to offer the Profession a large variety to select from.

Gum and Plain Teeth $1.00 per Set of 14 Teeth.

Gum and Plain	**Teeth,**	**10**	**Sets,**	**87½**	**cts. per**	**set of**	**14 Teeth.**
"	"	25	"	82½	"	"	"
"	"	50	"	75	"	"	"
"	"	100	"	70	"	"	"

These prices are for Cash only, which must accompany the order, or the Teeth will be sent C. O. D. and expressage added.

The Teeth are warranted to give satisfaction or the money will be refunded.

H. C. CORFIELD & CO.

37 North Tenth Street, Philadelphia, Pa.

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TROMMER'S EXTRACT OF MALT.

The rapidly increasing demand for our IMPROVED EXTRACT OF MALT, during the four years that it has been manufactured and offered to the medical profession in America, justifies the belief that in its production here we are meeting a generally felt want.

Long experience in manufacturing Malt Extract has enabled us to completely overcome the many difficulties attending its manufacture in large quantity; and we positively assure the profession that our Extract of Malt is not only perfectly pure and reliable, but that it will keep for years, in any climate, without fermenting or molding, and that its flavor actually improves by age. Our Extract is guaranteed to equal, in every respect, the best German make, while, by avoiding the expenses of importation, it is afforded at less than half the price of the foreign article.

The Malt from which it is made, is obtained by carefully malting the very best quality of selected Toronto Canada Barley. The Extract is prepared by an *improved process*, which prevents injury to its properties or flavor by excess of heat. **It represents the soluble constituents of Malt and Hops,** viz: MALT SUGAR, DEXTRINE, DIASTASE, RESIN AND BITTER OF HOPS, PHOSPHATES OF LIME AND MAGNESIA, AND ALKALINE SALTS.

Attention is invited to the following analysis of this Extract, as given by S. H. Douglas, Professor of Chemistry, University of Michigan, Ann Arbor:

TROMMER EXTRACT OF MALT CO:—I enclose herewith my analysis of your Extract of Malt:

Malt Sugar 46.1; Dextrine, Hop-bitter, Extractive Matter, 23.6; Albuminous Matter (Diastase), 2.469; Ash—Phosphates, 1.712; Alkalies, .377; Water, 25.7; Total, 99.958.

In comparing the above analysis with that of the Extract of Malt of the German Pharmacopœia, as given by Hager, that has been so generally received by the profession, I find it to substantially agree with that article.

Yours truly, SILAS H. DOUGLAS,
Professor of Analytical and Applied Chemistry.

This invaluable preparation is highly recommended by the medical profession, as a most effective therapeutic agent for the restoration of delicate and exhausted constitutions. It is very nutritious, being rich in both muscle and fat producing materials.

The very large proportion of *Diastase* renders it most effective in those forms of disease originating in *imperfect digestion of the starchy elements* of food.

A single dose of the Improved Trommer's Extract of Malt, contains a larger quantity of the active properties of Malt, than a pint of the best ale or porter; and not having undergone fermentation, is absolutely free from alcohol and carbonic acid.

The dose for adults is from a dessert to a tablespoonful three times daily. It is best taken after meals, pure, or mixed with a glass of milk, or in water, wine, or any kind of spirituous liquor Each bottle contains 1½ lbs. of the Extract.

Our Preparations of Malt are for sale by Druggists generally throughout the United States and Canadas, at the following prices:

EXTRACT OF MALT,	*With Hops (Plain)*	. . . . .	. . .	. . .	$1 00
" " "	" *Pyrophosphate of Iron (Ferrated)*	. . .	. . .	. . .	1 00
" " "	" *Cod Liver Oil,*	. . . . .	. . .	. . .	1 00
" " "	" *Cod Liver Oil and Iodide of Iron,*	. . .	. . .	. . .	1 00
" " "	" *Cod Liver Oil and Phosphorus,*	. . .	. . .	. . .	1 00
" " "	" *Hypophosphites,*	. . . . .	. . .	. . .	1 00
" " "	" *Iodides,*	. . . . .	. . .	. . .	1 50
" " "	" *Alteratives,*	. . . . .	. . .	. . .	1 50
" " "	" *Citrate of Iron and Quinia,*	. . . . .	. . .	. . .	1 50
" " "	" *Pepsin.*	. . . . .	. . .	. . .	1 50

MANUFACTURED BY

TROMMER EXTRACT OF MALT CO.,

FREMONT, OHIO.

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HIGHEST AWARDS FOR ARTIFICIAL TEETH

AWARDED TO

H. D. JUSTI,

In competition with all the best makers of

PORCELAIN TEETH

in the World, at the International Exhibitions of

VIENNA, SANTIAGO DE CHILI, PHILADELPHIA.

EXTRACT

From the General Report of the Judges on Awards of Group XXIV., Centennial International Exhibition, 1876.

"H. D. Justi exhibited nothing but teeth, but his display was beautiful in the extreme. In color, translucency and texture, they were all that could be desired; they were a faithful reproduction of the physiological characteristics of the natural organs, both to the individual teeth and relatively to the entire set. Their conformation with reference to close and easy adaptation to the maxillary arch showed careful study of the needs of both patient and operator. Their various and numerous deviations from uniformity of arch and outline, simulating the irregularities of nature, was so perfect that when in the mouth no suspicion of their artificial nature would be entertained. The disposition of tooth-material was so skillfully managed as to secure the greatest amount of strength with the least bulk; and the insertion of platinum pins was so arranged as to render their displacement an almost impossible accident."

H. D. JUSTI,

PRINCIPAL DEPOT, 516 Arch St., Philadelphia.

—BRANCHES:—

No. 66 E. Madison St., Chicago. **No. 16 Rue St. Marc, Paris, France.**

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To the Dental Profession.

After having successfully established a reputation for our new German cement, owing to its superior merits over other plastic cements in the market, (a fact which is undisputed and is proven by testimonials from gentlemen of the highest standing in the profession), the importance of an article possessing still higher qualities entered our mind, and now after years of unceasing experiments and tests, success has crowned our efforts in producing an article strictly our own manufacture, which we know to be superior to all other cements now in use, and therefore name it:

H. D. JUSTI'S "ACME" CEMENT.

It is manufactured under our personal supervision, and we can guarantee its uniformity in quality and its durability; it is free from all such substances that produce but a temporary hardening, readily destroyed by the secretions of the mouth. It combines all the cardinal properties a cement should possess, does its work unerring, complete, and is lasting.

We also claim originality in our bottles, the stopper formed in the shape of a bowl (as illustrated in cut), is intended for the manipulation of the cement, and for carrying the same to the mouth; this is very convenient for the operator, and saves the expense of the finger-tray now used for that purpose.

To avoid impositions which have often been practised with our new German cement, we call the attention of purchasers to our name and trade mark on every bottle.

We furnish two colors: No. 1, a soft medium yellow; No. 2, a soft medium gray. These the most particular operator will find sufficient for the various cases presenting themselves.

Price, One Ounce Bottles,	**$3 00**
" **Half Ounce Bottles,**	**1 50**
" **of set of both Colors, ½ oz. each, with 1 oz. Liquid,**	**3 50**
" **New German Cement,**	**3 00**

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HOOD & REYNOLDS,

DENTAL DEPOT,

74 Tremont St., Boston.

GOLD CYLINDERS.

Style A.

Flattened.

Nos. ½ 1 1½ 2

Style A.

Loose, and can be used as Pellets.

Nos. ½ 1 1½ 2 3

Style B.

Loose, but more compact than Style A.

Nos. 1 2 3 4

Style C.

Compact, but not Hard, used as Cylinders only.

Nos. 2 3 4 5 6

Style A, Flattened Cylinders, are mostly used.

These numbers are to denote that No. ½ is a half sheet of No. 4 Gold Foil cut into strips and rolled into cylinders. No. 1, one sheet; No. 1½, one sheet and a half; No. 2, two sheets, &c.

TWO PATENTS SEPT. 19, 1876.
PATENT SEPT. 25, 1876.
PATENT APRIL 17, 1877.

These Cylinders are made from Soft Foil, otherwise called Accommodation Foil, and can be made cohesive by annealing. The advantage over sheet foil is, that they are ready for use, and therefore save the time consumed in preparing foil; also, loss in scraps. As they are made from Soft Foil, and cut by machinery into strips, and then rolled into cylinders, without any handling with the hands, they are in the most favorable condition for use.

In making these Cylinders our best 1000 Gold Foil is used.

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No. 100 Boylston St.,
Boston, Nov. 13, 1876.

MESSRS. HOOD & REYNOLDS:

Gents—I take pleasure in giving you my sincere congratulations upon the success of your efforts to furnish the profession with gold cylinders. Those made from your "crystalline surface" non-cohesive foil, work admirably when used as intended, without re-heating. It was a happy thought to wrap them in one layer of cohesive foil to prevent unrolling. I have long used your "crystalline surface foil" in making my own cylinders, and am now glad to get, in addition, cylinders ready made from the same foil, and possessing the same excellent working qualities. If you quote my endorsement of your cylinders, please understand that it applies only to those made as above, and used without re-heating, as I do not believe in the use of cylinders made from cohesive foil, or re-annealed by the dentist.

Very truly,

L. D. SHEPARD,
Assistant Professor of Operative Dentistry in Harvard University.

---

347 Columbus Avenue,
Boston, Mass., Nov. 13, 1876.

MESSRS. HOOD & REYNOLDS:

Dear Sirs—It is not my custom to give certificates of approval for the public prints, but having had long experience in the use of your foils, and known your personal endeavors to secure perfection in filling materials, I am ready to testify to their purity, strength and superior working qualities, and I am particularly pleased with your new gold cylinders, which it seems to me that I shall adopt to the almost entire exclusion of every other form of foil.

Yours truly,

J. T. CODMAN, D. M. D.

MESSRS. HOOD & REYNOLDS:

For two months or more I have been using in my practice your cylinders. I have never before been satisfied to use any offered to the profession, though trying them repeatedly, but have soon returned to those made by myself by hand. I find yours are far preferable to those I have made or I have ever used. I feel now I cannot do without them in my practice.

E. G. LEACH, D. D. S.

422 Columbus Avenue, Boston.

MESSRS. HOOD & REYNOLDS:

Dear Sirs—I am using your cylinders with very great satisfaction. I am particularly pleased with the working of your soft cylinders, covered with a coating of cohesive gold. A happy hit. They have but to be tried to be appreciated.

I. A. SALMON,
670 Tremont Street.

Boston, Nov. 13, 1876.

Boston, Nov. 10, 1876.

MESSRS. HOOD & REYNOLDS:

Gentlemen—I have used your cylinders from the first, and consider them in every desirable quality by far the best I have ever used.

Truly yours,

THOMAS H. CHANDLER.

MESSRS. HOOD & REYNOLDS:
5 Jackson Place, Boston:

Genesee, N. Y., Oct. 29, 1876.

Please send me one Book No. 4 Non-Cohesive Foil; three Books No. 4 Soft Foil.

After having used your non-cohesive and soft foil for the past three years, I find it the most *uniform of any* I ever used. It is as *soft as down* and as *tough as chamois skin*, and I do not know as I ever saw a filling turn dark in the mouth that was made of your gold. It is all any one can desire in every respect.

Yours respectfully,

F. E. HOWARD, M. D. S.

Digitized by Google

Hartford, Conn., Oct. 29, 1877.

MESSRS. HOOD & REYNOLDS:

Dear Sirs—Allow me to recommend your gold, after three years' trial in comparison with other manufacturers, as being the most satisfactory of any I have ever used. For the more common operations I use your soft foil, without annealing. The past year I have been using more or less of your cylinders, and like them very much indeed.

L. C. TAYLOR.

MESSRS. HOOD & REYNOLDS:

Having used your gold foil for the last eight years or more, it gives me pleasure to say that it has been more uniform than any gold I have ever worked, and the satisfaction I have had from it in my practice has been a great source of comfort. Your very soft foil, both in sheets and pellets, is splendid, possessing as it does a degree of adhesiveness, which finishes up beautifully, and always giving a surface to which your more adhesive foil will take nicely. Adhesive soft foil in my hands has proved a valuable feature. For building and crown surfaces, your very adhesive gold deserves the highest praise. Plugs made from your foil keep clean, and seldom if ever discolor on the surface, a fact which speaks well for its purity and your chemical skill.

New Haven, March, 1878. H. J. STEVENS.

MESSRS. HOOD & REYNOLDS:

For some years past I have almost exclusively used Gold Foil manufactured by Hood & Reynolds, and continue to use it, as I am satisfied that it is as uniformly reliable as any in the market. Several months since, my attention was called to their Flattened Cylinders. I was at first rather unwilling to try them, as the various cylinders I had previously used (H. & R.'s among the rest,) did not, in my estimation, fulfil the requirements of the profession: but, after a fair trial of the Flattened Cylinders, I found that their soft and yet adhesive qualities, under manipulation, gave such satisfactory results, that I cannot but express my sincere approval, believing that they meet a long felt want among our best operators.

J. H. BATCHELDER.

Jan. 1, 1878. 137 Washington Street, Salem, Mass.

PRICE LIST.

Gold Cylinders.

Per Ounce,	$30.00
" ½ "	15.00
" ⅛ "	4.00

Crystalline Surface.

Per Ounce,	$30.00
" ½ "	15.00
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Cohesive, Non-Cohesive or Soft Foil.

Per Ounce,	$30.00
" ½ "	15.00
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Spring Tempered Nerve Bristles.

The Invention of PROF. R. B. DONALDSON, of Maryland Dental College.

Patented April 1878.

The temper of these instruments is such, that no matter how they are bent, there is no possible danger of breaking one of them off in the root of a tooth.

In removing a pulp, pass the bristle carefully as near the apex of the root as possible, (the point of the hook being against the wall of the canal) when a few rapid revolutions of the instrument will sever the pulp at the foramen, and wrap it so securely around the hook that it can be withdrawn entire in almost every case at the first attempt.

The plain bristle (without the hook at the end) is slightly roughened, to retain securely a shred of cotton wrapped around it. These will be found to be very useful for cleaning and drying out pulp canals, and for introducing medicaments in the treatment of abscess, &c.

Price per Set of Ten with Rubber Handles $3.

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Continuous Gum Sections.

Under the above name I am now introducing an article which will supply a want long felt by the profession.

CONTINUOUS GUM WORK

is admitted by the highest authorities in the profession as the nearest approach to nature; but the difficulty in and cost of constructing the same have prevented its general adoption.

Years of experiments have enabled me to produce

Continuous Gum Teeth in Sections

FOR RUBBER WORK

in great variety of shapes, sizes and curves, which, if properly selected and adapted, will give entire satisfaction to dentists and patients, being a faithful reproduction of the natural organs.

These new sections are alphabetically marked and will appear in my new catalogue, now in construction, with illustrations how to select.

The teeth are light and strong, the pins double-headed, well-secured in the body, and the heaviest now made, not excepting any other manufacture.

Price per tooth 18 cents. Furnished in sets of 14s and 28s only.

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